

THE INVISIBLE LABOR, VISIBLE HARM: A REVIEW OF HEALTH HAZARDS AMONG WOMEN IN BEEDI ROLLING SECTOR

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ABSTRACT

The purpose of this review was to investigate the impact of health risks among women beedi rollers within the beedi manufacturing sector. It carefully compiles the current body of research by analyzing the job-related exposures, underlying biological mechanisms, and consequential health issues, like musculoskeletal, respiratory, dermatological, and psychosocial challenges. Moreover this review highlights the socioeconomic vulnerabilities prevalent among these workers and examines potential interventions aimed at mitigating these concerns. The results showed that women engaged in beedi rolling bear a substantial health burden due to direct exposure to tobacco dust, inadequate ergonomic environments, and restricted access to adequate healthcare services. Consequently, these findings strongly advocated the implementation of targeted policy interventions, robust health surveillance programs, and the development of sustainable alternative livelihood opportunities for this marginalized communities.

KEYWORDS: Beedi rolling, Women workers, Occupational health, musculoskeletal disorders, Reproductive health.

Received: 26-Sep-2025

Accepted: 30-Oct-2025

Published: 15-Nov-2025

1. INTRODUCTION

The unorganized beedi manufacturing industry provides considerable employment to women employees from economically weaker communities. While this work offers a source of income, the associated occupational environment presents considerable hazards. These include persistent exposure to tobacco dust, dermal absorption of nicotine, inadequate ventilation, the demands of repetitive hand motions, and the physical strain of prolonged sedentary postures. Mobilizing unorganized workers into trade unions presents several challenges. Initially, this group largely comprises vulnerable populations, including women and contract employees, which means unemployment issues are particularly severe in this segment (Sundaram, 1996). Additionally, the informal sector suffers from rising prices, a lack of social security, inadequate skills and organization, and unhealthy competition among workers, all of

which contribute to its struggles. Moreover, the features of the unorganized sector such as the small size of enterprises, the indistinct lines between employers and employees, dispersed work locations, high illiteracy rates, poverty, and a general lack of awareness make it exceptionally difficult for trade unions to engage these workers effectively (Gill, 1999). Consequently, when it comes to addressing the challenges faced by beedi workers, complications arise since part of the beedi industry is organized while another remains unorganized.

Despite these standard risks, the health status of women engaged in beedi rolling has historically garnered insufficient attention within public health research and discourse. The present study consolidates and critically examines specific occupational health challenges faced by women beedi rollers in this industry through this review.

2. STATEMENT OF THE PROBLEM

Women involved in the beedi rolling industry face significant health risks that are physically demanding (Tyagi et al., 2023). Women enter the beedi industry to improve the economic difficulties faced by their families. As a result, they face chronic stress and other health problems (Mahandi et al., 2024; Sukumar et al., 2024). Despite knowing the risks involved to their health, most of the women beedi workers refuse to give up this hazardous work because the income from beedi rolling forms the basis of their livelihood. As a result, they fear losing their jobs if they speak out publicly about the problems they face (Kumar et al., 2021). Lack of health and safety regulations and labor laws greatly affects informal beedi workers, especially women. These women often face high occupational health risks because their working conditions are unpredictable and they have limited access to healthcare under this unorganized sector (Naicker et al., 2021; Aronsson et al., 2023). Moreover, Vulnerability among these workers increases due to poor social protection and weak labor law enforcement (Naicker et al., 2021). It is essential to understand these hazardous health risks especially among aged women who do not have any earnings to improve interventions and protections (Rajbangshi & Nambiar, 2020). This study seeks to shed light on the extreme health problems faced by beedi workers in general, given the immediate consequences and impact of tobacco-related industries (Das & Saha, 2024; Soumiya et al., 2020).

3. OVERVIEW OF THE BEEDI MANUFACTURING IN INDIA

A beedi is a thin cigarette from South Asia, also known as Indian country cigar (Singh & Poonam, 2015). It has 0.2–0.3 grams of tobacco flake enclosed in a tendu (*Diospyros melanoxylon*) leaf or temburni leaf and tied with coloured thread at both ends (Senthil and Subburethina, 2010; Singh et al., 2014). The beedi is four to eight cm in length. The diameter at the closed end is 0.6 - 0.8 cm, and the width at the smoking end is 0.7-0.9 cm (Bhonsle et al., 1992). The tendu leaf constitutes 60% of the weight of the beedi (Jayant and Pakhale, 1987). In addition, tobacco has about 4000 active chemical compounds, of which more than 50 are carcinogenic; the list includes nitrosamines, polycyclic aromatic hydrocarbons, radioactive elements, and cadmium (Robert, 1988). Depending on the individual skill, each worker rolls somewhere between 400 and 1000 beedis a day as an average. The beedi rolling industry exacts a heavy price from its workers through demanding those long hours of sedentary work and relentless exposure to tobacco dust and it will cause severe physical ailments. Furthermore, the tedious nature of the work is a common source of profound psychological distress, making it a challenge to both body and mind (Singh & Poonam, 2015).

4. WOMEN'S OCCUPATIONAL HEALTH (WOH)

Diverse countries have radically diverse patterns of women's occupations. Nowadays, it is widely recognized that a society's growth and development may be measured by the economic position, safety standards, security, and welfare of women. However, promising research in WOH has been rare (Zahm et al., 1994, 2000; Niedhammer et al., 2000). In industrially developing nations, women make up a sizable portion of the labor force working in the informal economy. Because of high rates of unemployment and poverty, many women have little alternative but to engage in extremely hazardous residential occupations like beedi rolling. The 2011 Indian Census found that out of a total of 149.8 million working-age women, 121.8 million were located in rural areas and 28.0 million in urban areas, as reported by the Office of the Registrar General and Census Commissioner of India. The workforce employs 149.8 million women, of whom 35.9 million work as cultivators and 61.5 million as agricultural laborers. There are 43.7 million female workers overall, with 8.5 million working in the household industry. In addition to these activities, they dedicate nearly five to twelve hours daily to domestic duties. Women in sixteen Indian states rely on beedi rolling as a main source of income and employment because it is completely manual work (Singh & Poonam, 2015). However, the significant health risks linked to long-term exposure to tobacco dust and prolonged static postures frequently diminish these economic advantages. This often results in various musculoskeletal and respiratory problems among women involved in beedi rolling.

5. METHODOLOGY

A structured literature search was conducted to identify previous status of relevant studies concerning the health status of beedi rollers. The search was performed across prominent academic databases including, Scopus, PubMed and Google Scholar. The keywords utilized for this study were: "beedi rolling," "women workers," and "occupational health." The selection process for including and excluding studies adhered to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines. A detailed flow diagram was prepared to visually illustrate the application of these inclusion and exclusion criteria throughout the literature selection process. See (Fig.1).

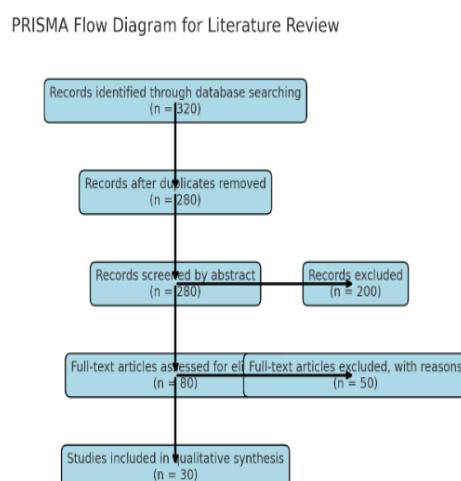


Figure 1: Flow Diagram Used for Inclusion of Literature Review

Table-1. Summary of Key Studies

Author/ Year	Design	Sample Size	Main Findings
Rao et al. (2020)	Cross-sectional	500 women workers	High prevalence of musculoskeletal and gynecological issues

Shenoy et al. (2020)	Cohort study	200 pregnant women	Higher rates of low birth weight and adverse pregnancy outcomes
Tyagi (2023)	Systematic review	25 studies	Respiratory, musculoskeletal, and reproductive morbidity prevalent
Bhisey (1999)	Biological monitoring	50 exposed workers	Evidence of genotoxicity in beedi workers
Austin JED (2024)	Cross-sectional	300 workers	Thyroid/endocrine disruption among women beedi rollers
Kolar Survey (2024)	Cross-sectional	400 workers	Majority with musculoskeletal pain and respiratory symptoms
Kumar (2025)	Socioeconomic analysis	200 workers	Socioeconomic vulnerabilities shape health risks
Subramani et al. (2025)	Cross-sectional survey	350 workers	Workers report poor health and willingness for alternatives
Genetic Study (2024)	Genetic association study	150 women	Polymorphisms linked to adverse reproductive outcomes
Ravi et al. (2024)	Qualitative study	40 women (focus groups)	Stress, reproductive health challenges, poor awareness

6. RESULTS

1. Musculoskeletal Disorders

Prolonged sitting in cramped positions and repetitive rolling movements result in high rates of back pain, shoulder pain, and joint stiffness. Studies consistently report that over 70% of women workers complain of chronic musculoskeletal symptoms.

2. Respiratory Morbidity

Continuous inhalation of fine tobacco dust leads to respiratory problems such as chronic cough, breathlessness, wheezing, and higher prevalence of asthma-like symptoms.

3. Reproductive and Maternal Health

Several studies indicate adverse reproductive outcomes, including menstrual irregularities, miscarriages, preterm births, and low birth weight infants. Nicotine absorption and genotoxic effects appear to contribute to these outcomes.

4. Dermatological and Eye Problems

Exposure to tobacco dust and handling of leaves without protective gear causes skin irritation, contact dermatitis, and eye problems including conjunctivitis and watering eyes.

5. Genetic and Endocrine Effects

Bio-monitoring studies show evidence of DNA damage and increased micronuclei in cells. Endocrine disruption, including thyroid abnormalities, has also been reported.

6. Psychosocial and Economic Stress

Beedi rolling is poorly paid, exploitative, and often done under home-based settings. Stress, anxiety, and lack of social security further contribute to poor overall health.

DISCUSSION

Women beedi rollers in the unorganized tobacco are facing a variety of health hazards due to direct exposure to tobacco fumes. This exposure, combined with unergonomic work positions and extremely long working hours, leads to a massive amount of occupational health issues. Musculoskeletal ailments, including persistent back and shoulder pain, are extremely common, affecting more than seventy percent of the labor force. Additionally, constant inhalation of tobacco dust leads to respiratory problems, chronic coughs, wheezing, and asthma. Prevalent Reproductive health and maternal well-being are also significantly impacted.

The genotoxic properties of nicotine and tobacco dust are believed to be significant contributors to these adverse reproductive outcomes. Furthermore, direct contact with tobacco dust and a lack of protective equipment frequently result in skin irritations, dermatitis, and eye infections, such as conjunctivitis.

Beyond respiratory and skin conditions, the biological consequences extend to genetic and hormonal imbalances, such as DNA damage and thyroid dysfunction. These findings underscore the serious long-term health risks associated with exposure to tobacco dust. Moreover, the psychological and financial strain stemming from unfair labor practices and the absence of social safety nets exacerbate these health challenges, contributing to heightened anxiety and an overall decline in general welfare.

The findings of this study underscore the urgency of implementing protective measures, improving workplace conditions, and adopting policies to safeguard the health of tobacco workers. These actions are critical for ensuring worker well-being and the sustainable development of the tobacco industry. Comprehensive measures addressing both the physical and psychosocial dimensions of the work environment must be implemented to effectively mitigate the broad range of health risks associated with tobacco dust exposure.

7. CONCLUSION

To protect women beedi workers from occupational hazards, it is essential to study the common health risks associated in the beedi-rolling sector. Through providing necessary skills through vocational education, we will make them safer and help them improve their living standards by focusing on their problems and pushing for preventive measures. It is also important for employers to ensure that their employees have the good working infrastructure, such as a well-ventilated workplace, adequate intervals and personal protective materials like gloves and hand masks. These programs work together to make the workplace safer and healthier for women in this sector by minimizing health risks and making the more sustainable workplace.

The results of this study underscore the prevalent health risks associated with the unorganized tobacco industries. A considerable number of participants were unaware of the harmful effects of tobacco dust. This highlights an urgent need to raise awareness among the beedi workers about the dangers involved in handling tobacco products, especially within marginalized communities. The research clearly indicates that tobacco exposure whether through direct inhalation or passive inhalation poses persistent health hazards to beedi workers engaged in the rolling process. The widespread health issues observed among all surveyed beedi workers emphasize the critical importance of improving health education and implementing stronger safety measures. It is imperative to promptly implement a comprehensive policy framework aimed at strengthening regulatory control to improve the welfare of female beedi rollers and benefit numerous individuals in Tamil Nadu. The researchers stressed that governmental intervention is essential and should be initiated without delay to tackle this pressing concern.

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