

Systematic Review

Epidemiology of major limb amputation in India: a systematic review of regional and demographic trends

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ABSTRACT

Major limb amputation remains an important cause of disability worldwide and is associated with substantial physical, psychological, social, and economic consequences. This study aimed to evaluate the epidemiology, etiology, and regional variation of major limb amputations in India. A systematic review was conducted in accordance with PRISMA guidelines. PubMed, Scopus, Web of Science, and Google Scholar were searched from January 1980 to March 2026. Of 150 records identified, 14 studies met inclusion criteria. A total of 7,272 patients were analyzed. Trauma accounted for 5,316 cases (73.1%) and non-traumatic causes for 1,956 cases (26.9%). Males represented 81.3% of reported patients and lower-limb amputations accounted for 90.8% of all reported amputations. Major limb amputation remains a significant public health challenge in India. Strengthening injury-prevention initiatives, improving management of diabetes and vascular disease, and expanding access to rehabilitation and prosthetic services may help reduce the burden of limb loss in India.

Keywords: Limb amputation, Limb loss, Etiology, Trauma, India, Systematic review

INTRODUCTION

Limb amputation is a major cause of disability worldwide and is associated with profound economic, psychological, and social consequences for affected individuals and their families.^{1,2} The term amputation is derived from the Latin word *amputare* (“to excise” or “to cut out”) and has been defined as the removal of part or all of a body structure enclosed by skin.³ The incidence of limb amputation has increased steadily over recent decades, partly due to the rising prevalence of diabetes mellitus in both developed and developing countries. Trauma remains one of the leading causes of limb amputation globally, while diabetes and its vascular complications are also significant contributors.⁴ In many developing countries, trauma and road traffic injuries continue to account for a substantial proportion of amputations, whereas in developed countries complications related to diabetes constitute a major cause of limb loss. In India, despite improvements in healthcare

infrastructure and road safety initiatives, road traffic accidents continue to contribute significantly to traumatic limb amputations. However, the causes and patterns of limb amputations may vary considerably across different regions due to differences in socioeconomic status, healthcare access, urbanization, and disease burden. India is characterized by substantial geographic, socioeconomic, and healthcare diversity. Differences in urbanization, industrial activity, road traffic density, prevalence of diabetes, and access to healthcare services may contribute to regional variation in the epidemiology of limb amputations. Understanding these differences is important for developing region-specific prevention strategies and rehabilitation programs. The present study aims to systematically analyze the causes of limb amputations and examine regional variations across India. To our knowledge, this is among the first studies to synthesize data from previously published literature across India and

compare inter-regional variations in limb amputation patterns.

METHODS

Study design

This study was conducted as a systematic review to evaluate the causes of limb amputations and regional variations across India. The methodology was developed in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines.

Search strategy

A comprehensive literature search was performed using electronic databases including PubMed, Scopus, Google Scholar, and Web of Science for studies published from January 1980 to March 2026. The search strategy included combinations of the following keywords limb amputation, limb loss, extremity amputation, lower limb amputation, upper limb amputation, India, etiology, causes, trauma, diabetes. An example search strategy used in PubMed was: (limb amputation, or limb loss, or extremity amputation) and (India) and (causes, or etiology, or, trauma, or, diabetes). The reference lists of included articles were manually screened to identify additional eligible studies.

Eligibility criteria

Inclusion criteria

Studies conducted in India, studies reporting epidemiological data or causes of limb amputations, observational studies including retrospective, prospective, and cross-sectional studies, studies involving upper and/or lower limb amputations, and articles published in English were selected.

Exclusion criteria

Case reports and case series with fewer than 10 patients; review articles, editorials, letters, and conference abstracts, duplicate publications, and studies lacking sufficient extractable data were excluded.

Study selection

Two reviewers independently screened titles and abstracts identified through the database search. Full-text articles of potentially eligible studies were assessed for inclusion. Disagreements between reviewers were resolved through discussion and consensus.

Data extraction

Data extraction was performed independently using a standardized data collection form. The following variables were extracted from each study: author name, year of publication, study location/state, geographic region of

India, study design, sample size, mean age of participants, sex distribution, type of amputation, and etiology of amputation (trauma, diabetes, vascular disease, infection, malignancy, congenital causes, and others).

Regional classification

For regional analysis, studies were categorized into four geographic regions of India: North, South, East, and West. Figure 1 illustrates the regional classification used in this review. Data on etiology, age, sex distribution, and limb involvement were subsequently aggregated according to these regional groupings. Studies were categorized into four geographic regions of India: North, South, East, and West. Regional comparisons were performed to assess variation in causes and patterns of limb amputations.

Statistical analysis

Data were summarized using descriptive statistics. Categorical variables were reported as frequencies and percentages, while continuous variables were reported as means where available. Regional comparisons were performed descriptively because of heterogeneity in study design, patient populations, and reporting methods. Owing to substantial variability in study methodology and outcome reporting, a formal meta-analysis was not performed. Union Territories were grouped into North, South, East, and West regions for comparison of limb amputation characteristics across India.

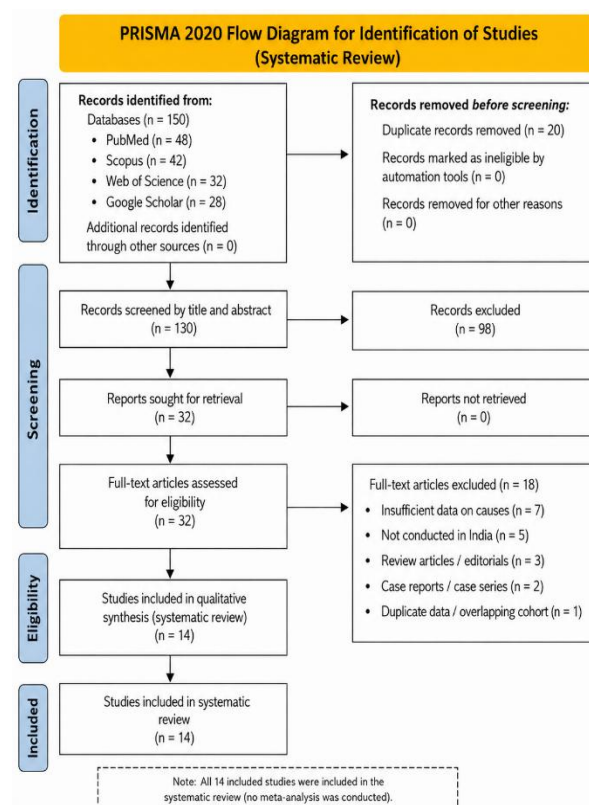


Figure 1: PRISMA.

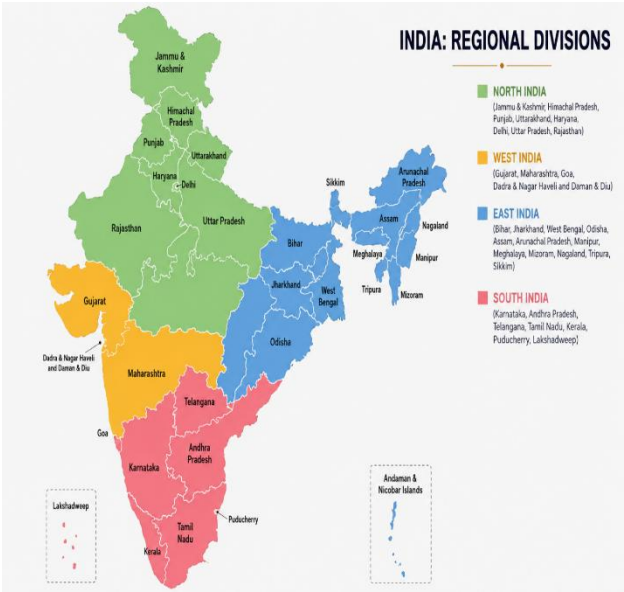


Figure 2: Geographic classification of India used for regional analysis.

RESULTS

A total of 14 studies met the inclusion criteria and were included in the review, representing 7,272 patients who underwent major limb amputation across different regions of India. The characteristics of the included studies are summarized in Table 1.

Regional distribution and etiology

The studies were distributed across the North, South, East, and West regions of India, allowing assessment of regional variation in amputation patterns. Regional differences in trauma-related and non-traumatic amputations are presented in Table 2. Among the included studies, trauma was the leading cause of amputation, accounting for 5,316 cases (73.1%), while non-traumatic causes accounted for 1,956 cases (26.9%). Trauma predominated in the North,

East, and West regions, whereas South India demonstrated a predominance of non-traumatic amputations.

Demographic characteristics

The mean age of patients ranged from 38 to 59 years across the included studies. A male predominance was observed in most studies. Among studies reporting sex distribution, 2,996 patients (81.3%) were male and 690 patients (18.7%) were female. Regional sex distribution is presented in Table 3.

Anatomical distribution

Lower-limb amputations were substantially more common than upper-limb amputations. Among studies reporting anatomical distribution, 5,046 amputations (90.8%) involved the lower limb and 512 amputations (9.2%) involved the upper limb. Regional anatomical distribution is shown in Table 4.

Regional trends

Considerable regional variation was observed across India. Trauma-related amputations predominated in the North, East, and West regions, whereas South India demonstrated a predominance of non-traumatic amputations. Despite these differences, lower-limb amputations and male predominance were consistently observed across all regions.

Key findings

Trauma was the predominant cause of major limb amputation in India. Lower-limb amputations were markedly more common than upper-limb amputations. Most amputees were middle-aged males. Considerable regional variation existed in amputation patterns across the country. South India was unique in demonstrating a predominance of non-traumatic causes of limb amputation, whereas trauma remained the leading cause in all other regions.

Table 1: Characteristics of included studies in the systematic review.

Study	Region	Year	N	Trauma (N)	Non-trauma (N)	Meanage	Male	Female	Lower-limb	Upper-limb
Pooja et al ⁵	East	2013	155	109	46	50	133	22	147	8
Ghosh et al ⁷	East	2026	736	598	138	57	598	138	639	93
Ali et al ¹⁰	South	2017	162	7	155	54	NR	NR	NR	NR
Unnikrishnan et al ¹²	South	2017	81	6	75	59	66	15	73	8
Kumar et al ¹³	South	2018	243	16	227	54	199	44	NR	NR
Singh et al ¹⁴	West	2021	3,408	2,793	615	45	NR	NR	3,237	171
Naik et al ¹⁷	West	2020	64	2	62	55	56	8	NR	NR
Shandilya et al ¹⁶	West	2020	1,548	1,245	303	40	1,355	193	NR	NR

Continued.

Study	Region	Year	N	Trauma (N)	Non-trauma (N)	Meanage	Male	Female	Lower-limb	Upper-limb
Puranik et al ¹⁵	West	2021	64	12	52	54	46	8	NR	NR
Reddy et al ⁶	North	2024	37	9	28	55	30	7	34	3
Kumar et al ⁹	North	2015	32	14	18	42	20	12	30	2
Deepak et al	North	2023	106	73	33	41	NR	NR	NR	NR
Kumar et al ⁸	North	2020	132	79	53	43	110	22	NR	NR
Muzaffar et al ¹¹	North	2023	504	353	151	38	383	121	461	43

Note: N- total sample size; n- number of patients; NR- not reported.

Table 2: Regional distribution of major limb amputations in India.

Regions	N	N (%)		Mean age (years)
		Trauma	Non-trauma	
North	811	528 (65.1)	283 (34.9)	41.7
South	486	29 (6.0)	457 (94.0)	54.9
East	891	707 (79.3)	184 (20.7)	55.8
West	5084	4052 (79.7)	1032 (20.3)	43.8
Total	7272	5316 (73.1)	1956 (26.9)	45.4

Table 3: Sex distribution of patients undergoing major limb amputation.

Regions	Male, N (%)	Female, N (%)	Total reported
North	543 (77.0)	162 (23.0)	705
South	265 (81.8)	59 (18.2)	324
East	731 (73.8)	260 (26.2)	991
West	1457 (87.5)	209 (12.5)	1666
Total	2996 (81.3)	690 (18.7)	3686

Note: Sex distribution data were unavailable in some included studies.

Table 4: Anatomical distribution of major limb amputations.

Regions	N (%)		Total reported
	Lower limb	Upper limb	
North	627 (88.9)	78 (11.1)	705
South	437 (89.9)	49 (10.1)	486
East	816 (91.6)	75 (8.4)	891
West	3166 (91.1)	310 (8.9)	3476
Total	5046 (90.8)	512 (9.2)	5558

Note: Anatomical distribution data were unavailable in some included studies.

DISCUSSION

This systematic review provides a comprehensive overview of the epidemiology and causes of limb amputations across India and highlights important regional differences in amputation patterns. The findings demonstrate that trauma remains the leading cause of limb amputation in most regions of the country, while South India is unique in exhibiting a predominance of non-traumatic causes. Additionally, males accounted for the majority of amputees, and lower-limb amputations were substantially more common than upper-limb amputations which was consistent with previous studies.⁵⁻⁸

The predominance of trauma as the leading cause of limb amputation in India is consistent with findings from other developing countries, where road traffic accidents, occupational injuries, and agricultural trauma continue to represent major public health challenges.⁸⁻¹⁰ Rapid urbanization, increasing motor vehicle use, inadequate road safety measures, and workplace hazards may contribute to the high burden of traumatic limb loss observed in many regions of the country. These findings underscore the need for strengthened injury prevention strategies, including road safety interventions, workplace regulations, and public awareness programs.

One of the most notable findings of this review was the regional variation in causes of limb amputation. South India was the only region in which non-traumatic causes exceeded traumatic causes as the leading indication for amputation.¹¹⁻¹³ This observation may reflect the higher prevalence of diabetes mellitus and peripheral vascular disease reported in several southern states, as well as improved trauma care and healthcare accessibility compared with other regions. Earlier detection and management of traumatic injuries may reduce the need for amputation, while the increasing burden of chronic diseases may contribute to a greater proportion of non-traumatic limb loss. This finding highlights the importance of region-specific public health strategies, with greater emphasis on diabetes prevention, foot-care programs, and vascular disease management in South India.

The review also found a marked male predominance among amputees across most studies. This finding is consistent with previous literature and may be explained by greater occupational exposure to hazardous environments, higher involvement in road traffic accidents, and increased participation in physically demanding occupations among men.^{5,6,11,12} Similar male predominance has been reported in studies from India, suggesting that gender-related exposure to injury risk remains an important determinant of limb loss.^{5,6,11,12}

The mean age of amputees in the included studies ranged predominantly from the fifth to sixth decade of life, indicating that limb amputation affects individuals during economically productive years.^{5,6,11-13} Traumatic amputations tended to occur in younger populations, whereas non-traumatic amputations were more common among older adults with chronic medical conditions. The resulting disability can therefore impose substantial economic and social burdens on affected individuals, families, and healthcare systems.

Lower limb amputations were considerably more common than upper limb amputations across the reviewed studies.^{5,6,14} This finding aligns with existing evidence demonstrating that diabetic foot disease, peripheral vascular disease, and lower extremity trauma account for the majority of amputations worldwide. The predominance of lower limb loss has important implications for rehabilitation services, prosthetic provision, and long-term mobility outcomes.

The findings of this review are broadly consistent with those reported by Ghosh et al., who identified trauma as the leading cause of limb amputation in eastern India and reported a predominance of male patients and lower limb involvement. Similar observations have been reported by studies in western India.^{16,17} However, the present review extends existing literature by comparing patterns across multiple regions and demonstrating substantial geographic variation in amputation etiology within India.

Limitations

This review has some limitations. The included studies varied substantially in design, sample size, patient populations, and reporting practices. Several studies did not report complete demographic or anatomical data, limiting pooled analyses. In addition, the absence of a national amputation registry in India restricts the ability to estimate the true burden of limb loss nationwide. Finally, because of methodological heterogeneity, a formal meta-analysis could not be performed.

CONCLUSION

Trauma remains the leading cause of major limb amputation in India, although substantial regional variation exists. South India was unique in demonstrating a predominance of non-traumatic amputations. The high burden among males and the predominance of lower-limb amputations emphasize the need for targeted prevention strategies, improved diabetes management, and expanded rehabilitation services. Establishment of a national limb amputation surveillance system may improve understanding of epidemiological trends and guide future public health interventions.

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REFERENCES

1. Yuan B, Hu D, Gu S, Xiao S, Song F. The global burden of traumatic amputation in 204 countries and territories. *Front Public Health*. 2023;11:1258853.
2. Mohan D. A report on amputees in India. *Orthot Prosthet*. 1986;40:16-32.
3. Banerjee SN. Limb amputation: incidence, cause, and prevention. In: Banerjee SN, eds. *Management of amputees*. Baltimore: Rehabilitation Medicine Library; 1982: 1-10.
4. Unwin N. Epidemiology of lower extremity amputation in centres in Europe, North America and East Asia. *Br J Surg*. 2000;87(3):328-37.
5. Pooja GD, Sangeeta L. Prevalence and aetiology of amputation in Kolkata, India: a retrospective analysis. *Hong Kong Physiother J*. 2013;31:36-40.
6. Reddy GP, Hari PS, Sahu S, Kumar M, Varma CK, Goyal V. Limb amputations in a tertiary care hospital, North India: a cross-sectional epidemiological study—can we prevent this? *J Mar Med Soc*. 2024;26:288-92.

7. Ghosh A, Mukherjee U, Singh KK, Majumdar S, Das PP, Khatua DI. Profile of amputees as recorded at the Regional Artificial Limb Fitting Centre of West Bengal. *Indian J Phys Med Rehabil*. 2026;36:46-51.
8. Kumar D, Mishra SR, Gupta AK, Yadav G. Quality of Life in People With Unilateral Lower Limb Amputation at a Tertiary Rehabilitation Centre in Northern India: A Cross-Sectional Study. *Cureus*. 2023;15(3):e36985.
9. Kumar D, Singh S, Shantanu K, Goyal R, Kushwaha NS, Gupta AK, Sharma VP, Sharma V. Need of Revision of Lower Limb Amputations in a North Indian Tertiary Care Centre. *J Clin Diagn Res*. 2015;9(12):RC01-3.
10. Ali M, Prasad KVS, Valiathan A. Changing trends in major lower limb amputations. *J Clin Diagn Res*. 2013;7(7):1344-7.
11. Muzaffar T, Shah BA, Bhat NA, Mir MR, Wani MM, Dar TA. Changing trends in aetiology of amputations: a 12-year retrospective cross-sectional study. *J Clin Diagn Res*. 2023;17(9):KC01-5.
12. Unnikrishnan EP, Rollands R, Parambil SM. Epidemiology of major limb amputations: a cross-sectional study from a South Indian tertiary care hospital. *Int Surg J*. 2017;4(5):1642-6.
13. Kumar GK, Souza C, Diaz AE. Incidence and causes of lower-limb amputations in a tertiary care center: evaluation of medical records over a period of two years. *Int J Surg Sci*. 2018;2(3):16-9.
14. Singh S. Epidemiological trends of lower limb amputation in Artificial Limb Centre. *Int Multispec J Health*. 2021;7(2):11-5.
15. Puranik AK, Maity S, Meena SP, Santra A, Lodha M, Badkur M. Quality of life of patients with major amputations in the tertiary care centre of Western Rajasthan: a prospective observational study in 2019-2020. *Cureus*. 2021;13(12):e20387.
16. Shandilya VK, Parmar LD, Shandilya AV. Lower limb amputations in Central Gujarat: a retrospective analysis of multiple camps. *J Integr Health*. 2020;9(2):29-33.
17. Naik D, Amin AB. Patterns and causes of major lower limb amputations in tertiary care centres. *J Dent Med Sci*. 2020;19(12):50-5.
18. Mishra S, Kumar D, Gupta AK, Yadav G, Ghosh S. A demographic study of lower limb people with amputation in a North Indian tertiary rehabilitation center. *Indian J Phys Med Rehabil*. 2020;31(1):11-3.

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