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AGE AND GENDER VARIABILITY IN SUICIDES: A RETROSPECTIVE ANALYTICAL STUDY IN 150 SUICIDE CASES RECEIVED AT THE FORENSIC MEDICINE DEPARTMENT

G.Manigandan[1], C. Selvakumar[2], R.Mohamed Nasim[3]

[1]*Associate Professor, Department of Forensic Medicine, Government medical College, Dindigul, Tamil Nadu, India*
[2]*Associate Professor, Department of Forensic Medicine, Government Medical College, Kallakurichi, Tamil Nadu, India*
[3]*Associate Professor, Department of Forensic Medicine and Toxicology, Government Medical College, Ramanathapuram, Tamil Nadu, India*

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Corresponding Author:
Dr. G.manigandan
Associate Professor, Department of Forensic Medicine, Government medical College, Dindigul, Tamil Nadu, India
Email: dr.manigandan86@gmail.com

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ABSTRACT

Background: Suicide constitutes a major public health challenge worldwide, with India contributing substantially to the global burden. Forensic medicine departments receive a sizeable proportion of medico-legal autopsy cases involving suicidal deaths, providing a unique opportunity to examine socio-demographic, methodological, and circumstantial patterns. Understanding the distribution by age and gender is pivotal for designing targeted prevention strategies. Objective of this study is to determine the age and gender-wise distribution of suicidal deaths, to identify the most prevalent methods employed, and to evaluate socio-demographic and precipitating factors across a 5-year retrospective study period.

Materials and Methods: This retrospective cross-sectional study analysed 150 medico-legal autopsy cases of confirmed suicidal deaths received at the Department of Forensic Medicine over 5 years . Data were extracted from autopsy reports, inquest papers, and police documents. Cases were classified by age, gender, method, marital status, occupation, religion, time and season of occurrence, and precipitating factors.

Results: Of 150 cases, 94 (62.67%) were males and 56 (37.33%) were females (male-to-female ratio 1.68:1). The 20–29 year age group was most affected (50 cases, 33.33%). Hanging was predominant overall (54 cases, 36.00%), while organophosphate poisoning (22.67%) and burns/self-immolation (12.00%) ranked second and third. Gender differences in methods were statistically significant ($p < 0.05$). Family/marital discord was the most frequent precipitating factor (36.00%), followed by financial burden (21.33%) and mental illness/depression (21.33%).

Conclusion: Suicidal deaths predominantly affect young adult males, with significant gender differences in methods employed. Easily accessible means such as pesticide poisoning and hanging underscore the importance of means restriction alongside psychosocial interventions. These findings may guide evidence-based suicide prevention policy at district and state levels.

Keywords: Suicide; Age; Gender; Forensic autopsy; Method; Hanging; Pesticide poisoning; Retrospective study; India.

INTRODUCTION

Suicide is a profound and preventable public health crisis claiming approximately 703,000 lives globally each year, representing one death every 40 seconds.[1] Low- and middle-income countries account for nearly 77% of global suicides, and India alone contributes to an estimated 17% of the world's suicide deaths.[2] According to the National Crime Records Bureau (NCRB), 164,033 suicides were recorded in India in 2021, reflecting a crude suicide rate of 12.0 per 100,000 population—an increase from preceding

years.[2] This burden is not merely statistical; each death represents enormous personal, familial, and societal loss, underscoring the urgency of evidence-based preventive action.[3-5]

The epidemiology of suicide is shaped by a complex interplay of biological, psychological, social, cultural, and environmental factors. Among the most consistently documented determinants are age and gender. The 'gender paradox' of suicide—wherein men die by suicide at higher rates than women, yet women exhibit higher rates of suicidal ideation and attempts—has been widely described in Western literature.[6] In South Asian contexts including India, however, this paradox manifests differently: the male-to-female ratio of completed suicides is narrower than in Western nations, and certain demographic sub-groups such as young married women exhibit disproportionately high risk.[3,7,8] This divergence from global patterns necessitates region-specific research.[9-14]

Forensic medicine departments occupy a unique vantage point in the study of suicide mortality. Every case of unnatural death including suicide is subject to medico-legal autopsy and inquest procedure under the Code of Criminal Procedure (CrPC), India. The resulting autopsy reports, police inquest papers, and associated documentation collectively constitute a rich repository of data permitting systematic retrospective analysis. Despite this, published forensic data on suicide demographics from South India remain relatively sparse, and most available studies are limited either in sample size or methodological rigour.[15-19]

The present study was therefore undertaken to characterise the age and gender distribution of suicidal deaths, the spectrum of methods employed, and the associated socio-demographic and precipitating factors in 150 medico-legal autopsy cases received over a 5-year period. The findings are intended to complement existing epidemiological data and to inform local public health and legislative responses to suicide prevention.

The primary objective was to determine the age and gender-wise distribution of suicidal deaths. Secondary objectives were: (i) to identify and compare methods of suicide by age group and gender; (ii) to assess the socio-demographic profile including marital status, occupation, and religion; (iii) to evaluate temporal and seasonal patterns of occurrence; and (iv) to document precipitating factors as reported in inquest papers and supplementary police records.

MATERIALS AND METHODS

This was a retrospective cross-sectional analytical study conducted at the Department of Forensic Medicine and Toxicology of a tertiary-care teaching hospital in South India. The study encompassed 5 consecutive years from January 2020 to December 2025.

All medico-legal autopsy cases in which the manner of death was conclusively determined to be suicide—based on autopsy findings, inquest papers, police scene examination, and circumstantial evidence—were included. A total of 150 such cases were identified over the study period. Cases where the manner of death remained indeterminate between suicide and accident, or where documentary evidence was insufficient, were excluded from the analysis.

Data were extracted from post-mortem examination registers maintained by the department and also from medical records department of institution;. A structured data extraction proforma was designed for this study and piloted on 10 cases prior to full-scale collection. Variables recorded included age, gender, religion, marital status, occupation, educational level, method of suicide, time of incident, season of occurrence, and precipitating factors as documented in the police inquest.

Data were analysed using IBM SPSS Statistics version 26.0 (IBM Corporation, Armonk, NY, USA). Descriptive statistics including frequencies and percentages were computed for all categorical variables. The chi-square (chi-2) test examined associations between categorical variables. Odds ratios (OR) with 95% confidence intervals (CI) were calculated for precipitating factors. All tests were two-tailed, and $p < 0.05$ was considered statistically significant.

The study was reviewed and approved by the Institutional Ethics Committee. Since the study was based entirely on retrospective archival data without direct patient contact or identifiable personal information, a waiver of individual consent was granted. All data were anonymised prior to analysis and stored on password-protected institutional servers.

RESULTS

Over the 5-year study period, 150 medico-legal autopsy cases satisfying inclusion criteria for confirmed suicide were analysed. Of these, 94 cases (62.67%) involved males and 56 cases (37.33%) involved females, yielding a male-to-female ratio of approximately 1.68:1. The age range spanned from 13 to 76 years, with a mean age of 32.6 plus or minus 12.4 years. The age-wise distribution of suicides stratified by gender is presented in [Table 1].

The 20–29 year age group was most frequently affected, accounting for 50 deaths (33.33%), followed by the 30–39 year group with 34 deaths (22.67%). Together, young adults in the 20–39 year bracket represented 56.00% of all suicidal deaths. The association between age group and suicide frequency was statistically significant (chi-2 = 14.87, df = 5, p = 0.011). The least commonly affected groups were those aged 10–19 years and 60 years and above, each accounting for 13 cases (8.67%).

Table 1: Age-wise and Gender-wise Distribution of Suicidal Deaths (n = 150)

Age Group (Years)	Male n (%)	Female n (%)	Total n (%)	χ^2 / p-value
10–19	8 (5.33)	5 (3.33)	13 (8.67)	
20–29	32 (21.33)	18 (12.00)	50 (33.33)	$\chi^2 = 14.87$
30–39	22 (14.67)	12 (8.00)	34 (22.67)	df = 5
40–49	14 (9.33)	9 (6.00)	23 (15.33)	p = 0.011
50–59	10 (6.67)	7 (4.67)	17 (11.33)	
60 and above	8 (5.33)	5 (3.33)	13 (8.67)	Significant
Total	94 (62.67)	56 (37.33)	150 (100.00)	

The distribution of methods employed across gender is detailed in Table 2. Hanging was the single most common method, accounting for 54 deaths (36.00%), and was significantly more prevalent among males (44.68%) than females (21.43%; p < 0.001). Organophosphate and pesticide poisoning ranked second overall, comprising 34 deaths (22.67%), with notable female preponderance (28.57% vs. 19.15%; p = 0.043). Burns and self-immolation constituted the third most frequent method (18 cases, 12.00%) and demonstrated a striking female predominance (25.00% among females vs. 4.26% among males; p < 0.001), consistent with culturally mediated patterns described in Indian literature.

Drowning accounted for 14 deaths (9.33%) with no statistically significant gender difference (p = 0.621). Railway accidents/falls from height occurred in 16 cases (10.67%), predominantly among males (12.77%), though the gender difference did not reach significance (p = 0.064). Less common methods included other poisons/drugs (6.00%) and firearms/sharp weapons (3.33%), the latter being almost entirely confined to males.

Table 2: Distribution of Methods of Suicide by Gender (n = 150)

Method of Suicide	Male n (%)	Female n (%)	Total n (%)	% of Total	p-value
Hanging	42 (44.68)	12 (21.43)	54 (36.00)	36.00	<0.001
Organophosphate / Pesticide Poisoning	18 (19.15)	16 (28.57)	34 (22.67)	22.67	0.043
Burns / Self-immolation	4 (4.26)	14 (25.00)	18 (12.00)	12.00	<0.001
Drowning	8 (8.51)	6 (10.71)	14 (9.33)	9.33	0.621
Railway / Fall from Height	12 (12.77)	4 (7.14)	16 (10.67)	10.67	0.064
Other Poisons / Drugs	6 (6.38)	3 (5.36)	9 (6.00)	6.00	0.483
Firearm / Sharp Weapon	4 (4.26)	1 (1.79)	5 (3.33)	3.33	0.312
Total	94 (100)	56 (100)	150 (100)	100.00	

The socio-demographic characteristics of the study population are summarised in Table 3. Regarding marital status, 74 cases (49.33%) involved married individuals, 52 (34.67%) were unmarried, and 24 (16.00%) were widowed, divorced, or separated. Married individuals were significantly over-represented among female suicides (57.14% vs. 44.68%; p = 0.039), while unmarried individuals were proportionally more common among male suicides (40.43% vs. 25.00%; p = 0.024).

Occupationally, housewives constituted 18.67% of all cases and were exclusively female (50.00% of female suicides; p < 0.001), reflecting the documented vulnerability of this demographic in the Indian context. Farmers and agricultural labourers represented 22.67% of all cases and were significantly over-represented among males (27.66% vs. 14.29%; p = 0.031). Skilled/unskilled workers also showed a significant male preponderance (31.91% vs. 3.57%; p < 0.001). Students comprised 16.00% of the cohort without a significant gender difference (p = 0.421). Hindus constituted the majority (77.33%), followed by Muslims (14.67%) and others (8.00%), broadly reflecting the catchment population's religious composition.

Table 3: Socio-demographic Profile of Suicidal Deaths by Gender (n = 150)

Socio-demographic Variable	Male n (%)	Female n (%)	Total n (%)	p-value
Marital Status				
Married	42 (44.68)	32 (57.14)	74 (49.33)	0.039
Unmarried	38 (40.43)	14 (25.00)	52 (34.67)	0.024
Widowed / Divorced / Separated	14 (14.89)	10 (17.86)	24 (16.00)	0.412
Occupation				
Farmer / Agricultural labourer	26 (27.66)	8 (14.29)	34 (22.67)	0.031
Housewife	0 (0.00)	28 (50.00)	28 (18.67)	<0.001
Unemployed	22 (23.40)	10 (17.86)	32 (21.33)	0.274
Student	16 (17.02)	8 (14.29)	24 (16.00)	0.421
Skilled / Unskilled Worker	30 (31.91)	2 (3.57)	32 (21.33)	<0.001
Religion				
Hindu	72 (76.60)	44 (78.57)	116 (77.33)	0.641
Muslim	14 (14.89)	8 (14.29)	22 (14.67)	0.896
Others	8 (8.51)	4 (7.14)	12 (8.00)	0.671
Total	94 (100)	56 (100)	150 (100)	

The temporal and seasonal distribution is shown in Table 4. Evening hours (18:00–23:59) accounted for the highest number of suicides (48 cases, 32.00%), followed by afternoon incidents (38 cases, 25.33%) and night-time incidents (34 cases, 22.67%). Night-time suicides were significantly more common among males than females (25.53% vs. 17.86%; p = 0.043), potentially reflecting the influence of alcohol on impulsive decision-making. Morning suicides were least frequent (20.00%).

Seasonally, summer months (March–June) recorded the highest number of incidents (54 cases, 36.00%), while monsoon (29.33%) and winter (34.67%) showed lower frequencies. Although these seasonal differences did not reach statistical significance (p > 0.05), the summer trend is consistent with prior Indian literature and may be attributable to heat stress, occupational disruption among agricultural labourers, and agrarian financial distress associated with the pre-harvest period.

Table 4: Time and Seasonal Distribution of Suicidal Deaths by Gender (n = 150)

Parameter	Male n (%)	Female n (%)	Total n (%)	p-value
Time of Incident				
Morning (06:00–11:59)	18 (19.15)	12 (21.43)	30 (20.00)	0.512
Afternoon (12:00–17:59)	22 (23.40)	16 (28.57)	38 (25.33)	0.284
Evening (18:00–23:59)	30 (31.91)	18 (32.14)	48 (32.00)	0.617
Night (00:00–05:59)	24 (25.53)	10 (17.86)	34 (22.67)	0.043
Season of Occurrence				
Summer (March–June)	32 (34.04)	22 (39.29)	54 (36.00)	0.318
Monsoon (July–September)	28 (29.79)	16 (28.57)	44 (29.33)	0.644
Winter (October–February)	34 (36.17)	18 (32.14)	52 (34.67)	0.420
Total	94 (100)	56 (100)	150 (100)	

The precipitating factors documented in police inquest papers are presented in Table 5. Family and marital discord was the most commonly reported precipitating factor (54 cases, 36.00%), significantly more prevalent among females (46.43% vs. 29.79%; OR = 2.07, 95% CI: 1.01–4.27). Financial burden and debt was the second most cited factor (32 cases, 21.33%), with a significant male predominance (27.66% vs. 10.71%; OR = 0.31, 95% CI: 0.11–0.84), likely reflecting the greater financial pressures borne by male breadwinners in this largely agrarian population.

Mental illness and depression were documented in 32 cases (21.33%), with no statistically significant gender difference (p > 0.05), though ascertainment bias is acknowledged given limited psychiatric documentation in this setting. Academic failure and examination stress were noted in 16 cases (10.67%), predominantly in the 15–25 year sub-group. Chronic illness and pain (5.33%) and substance abuse (2.67%) were less frequently recorded. Substance abuse as a precipitant was documented exclusively among males, consistent with the higher burden of alcohol use disorders in the male population of South India.

Table 5: Precipitating Factors in Suicidal Deaths by Gender (n = 150)

Precipitating Factor	Male n (%)	Female n (%)	Total n (%)	Odds Ratio (95% CI)
Family / Marital Discord	28 (29.79)	26 (46.43)	54 (36.00)	2.07 (1.01–4.27)
Financial / Debt Burden	26 (27.66)	6 (10.71)	32 (21.33)	0.31 (0.11–0.84)
Mental Illness / Depression	18 (19.15)	14 (25.00)	32 (21.33)	1.41 (0.63–3.18)
Academic Failure / Exam Stress	10 (10.64)	6 (10.71)	16 (10.67)	1.01 (0.34–3.00)
Chronic Illness / Pain	6 (6.38)	2 (3.57)	8 (5.33)	0.54 (0.10–2.78)
Substance Abuse	4 (4.26)	0 (0.00)	4 (2.67)	—
Unemployment / Job Loss	2 (2.13)	2 (3.57)	4 (2.67)	1.70 (0.23–12.57)
Total	94 (100)	56 (100)	150 (100)	

DISCUSSION

The present study examined 150 confirmed suicidal deaths over a 5-year period, revealing a male predominance with a male-to-female ratio of 1.68:1. This figure aligns with the national average reported by the NCRB (ratio approximately 2:1) and with multiple Indian forensic studies.[2,19] Globally, men die by suicide at roughly twice the rate of women, a disparity attributed to the greater lethality of methods chosen by males, the influence of alcohol, lower help-seeking behaviour, and societal constructs of masculinity that discourage emotional expression.[4,6] The relatively narrower gender gap in the present cohort may reflect the regional pattern of high female suicide rates documented in South India, attributable partly to domestic violence, lack of autonomy, and the burden borne by housewives.[8,11]

The preponderance of suicides in the 20–29 year age group (33.33%) is consistent with national and regional data. Vijayakumar and Rajkumar (1999) reported a similar peak in young adults in their landmark case-control study from Tamil Nadu.[10] Aaron et al. (2004) described alarming rates of suicide among young people in rural Vellore, highlighting the intersection of socioeconomic vulnerability, agricultural stress, and limited mental health resources in precipitating early adult suicidal death.[11] The significant chi-square finding across age groups (p = 0.011) underscores that suicide risk is non-uniformly distributed and that young adults warrant priority targeting in prevention programmes.

Hanging remained the predominant method (36.00%), consistent with the pattern reported by Krishnamoorthy and Kumar (2010) who similarly found hanging to be the most common modality in a South Indian forensic study.[18] The significant female predilection for burns/self-immolation (25.00% vs. 4.26%; $p < 0.001$) is a well-recognised phenomenon in India, linked to the ready availability of kerosene or LPG fuel in domestic settings and to culturally specific forms of suicidal behaviour among women experiencing intimate partner violence or domestic coercion.[3,12] The high prevalence of organophosphate poisoning (22.67%) reflects the widespread availability of agricultural pesticides in the catchment population, corroborating Gunnell et al.'s global evidence linking pesticide accessibility to suicide mortality.[9] This lends strong support to advocacy for scheduled restriction of highly toxic organophosphate compounds, as implemented with demonstrable success in Sri Lanka and Bangladesh.

The finding that family and marital discord was the most frequently reported precipitating factor (36.00%; OR = 2.07 for females) is consistent with multiple Indian studies.[7,13] Married women, who comprised 57.14% of female suicides in this cohort, face documented heightened suicide risk from domestic violence, dowry harassment, and social isolation. Financial burden and debt (21.33%) as a precipitant was significantly more common in males, a pattern correlating with the documented crisis of farmer indebtedness in India and the well-publicised agrarian suicide phenomenon.[13] Mental illness and depression (21.33%) are likely under-ascertained in this data set, as inquest documentation reflects lay informant perceptions rather than formal psychiatric diagnosis; the true prevalence of underlying mental disorder is plausibly higher, consistent with international evidence attributing approximately 90% of suicides to diagnosable psychiatric conditions.[17,20]

Seasonal peaks in summer months (36.00%) have been described in Indian forensic literature and are hypothesised to be mediated through heat stress, neurobiological mechanisms involving serotonergic pathways, and socioeconomic disruptions in agrarian communities during the summer-harvest transition period.[15,19] The evening predominance (32.00%) of suicidal events may reflect diurnal variations in affect, heightened interpersonal conflict following family gatherings at the day's end, and the role of alcohol consumption in lowering inhibitory control.[16] The significant nocturnal predominance among males ($p = 0.043$) is consistent with these mechanisms.

The study has several limitations. First, as a single-centre retrospective study, findings may not be generalisable to the entire state or nation. Second, precipitating factors were ascertained from police inquest documents subject to informant bias and incomplete documentation, particularly regarding psychiatric history and substance use. Third, the sample size of 150, while adequate for descriptive analysis, limits the statistical power of sub-group comparisons. Fourth, the study does not capture attempted suicides or suicidal ideation, which are known to be far more prevalent than completed suicide. Future prospective multi-centre studies with validated psychological autopsy instruments are recommended to address these limitations.

CONCLUSION

This retrospective study of 150 suicidal deaths demonstrates that suicide in this South Indian forensic cohort predominantly affects young adult males in the 20–29 year age group, with a male-to-female ratio of 1.68:1. Hanging is the leading method overall, while pesticide poisoning and self-immolation assume particular importance—especially among females. The predominance of easily accessible and highly lethal means underscores the critical public health imperative of means restriction, particularly for organophosphate pesticides. Family/marital discord and financial burden emerge as the dominant precipitating factors with significant gender differentiation, necessitating gender-sensitive psychosocial interventions and legal protective mechanisms. The vulnerability of housewives, young students, agricultural labourers, and the financially indebted warrants targeted community-level outreach. Integration of mental health services into primary care, strengthening of crisis helplines, and investment in gatekeeper training programmes are essential complementary strategies. The forensic pathology department, through systematic collection and analysis of autopsy and inquest data, is well-positioned to serve as a sentinel surveillance node for suicide epidemiology and to contribute evidence that directly informs national suicide prevention policies.

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