

The Burden of Caregiver Stress in Families of Patients with Heroin (Brown Sugar) Dependence: An Observational Study

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Abstract

Background: Substance dependence affects not only the individual but also the family unit, and relatives of patients with heroin dependence are known to carry a disproportionately high burden of care. Region-specific data on caregiver burden from Bihar, a state with a recognized and growing burden of heroin use, have been lacking despite the scale of the problem in districts such as Muzaffarpur.

Objectives: To assess the level of caregiver burden among primary caregivers of patients with heroin dependence and to determine its association with socio-demographic and clinical variables.

Methods: This hospital-based, cross-sectional, observational study was conducted among 100 patient-caregiver dyads attending the de-addiction services of a tertiary care centre in Muzaffarpur, Bihar. Caregiver burden was assessed using the 22-item Zarit Burden Interview (ZBI). Socio-demographic and clinical data were collected using a semi-structured proforma. Descriptive statistics, chi-square test, unpaired t-test, and Pearson's correlation were used for analysis.

Results: The mean ZBI score was 55.9 ± 14.6 , and 85% of caregivers experienced moderate-to-severe or severe burden. Caregivers of unemployed patients had significantly higher mean burden scores than those of employed patients (61.0 ± 13.1 vs 49.7 ± 14.0 , $p < 0.001$). Rural residence and intravenous route of drug use were also significantly associated with higher burden ($p = 0.010$ and $p = 0.011$, respectively). Burden correlated positively with the number of relapses ($r = 0.24$, $p = 0.017$) and number of substances used ($r = 0.25$, $p = 0.011$), but not with duration of dependence, comorbidities, family income, or family type.

Conclusion: Caregivers of patients with heroin dependence in this region experience a substantial burden of care, particularly when the patient is unemployed, resides in a rural area, uses drugs intravenously, or has a history of frequent relapse. These findings support the integration of family-focused counselling into routine de-addiction services.

Keywords: Caregiver burden; Heroin dependence; Zarit Burden Interview; Family burden; Substance use disorder; Bihar.

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Introduction

Heroin, locally referred to as "brown sugar" or "smack," continues to pose a major public health challenge in several regions of India, with Bihar — particularly the districts bordering Nepal and the wider North Bihar belt including Muzaffarpur — repeatedly identified in national surveys as carrying a disproportionately high burden of opioid use. Substance dependence is no longer viewed merely as an individual disorder; rather, it is increasingly recognised as a condition that disrupts the functioning of the entire family, and the family remains the primary resource for the care of a

substance-dependent member in the Indian context [1]. A substance-dependent family member disrupts almost every domain of family functioning — interpersonal relationships, leisure, and finances — and the cumulative toll of this disruption on relatives has been termed "family burden" [2]. Compared with healthy controls, relatives of patients with heroin dependence have been shown to carry a significantly higher burden of care and to report poorer quality of life across physical, psychological, social, and environmental domains [3]. In a Punjab-based sample of caregivers of

opioid-dependent patients, the majority of whom used heroin specifically, high levels of burden were reported across objective, subjective stress, and subjective demand domains [4]. Comparative Indian studies encompassing caregivers of patients with alcohol, opioid, and combined dependence have similarly found that the overwhelming majority of caregivers report moderate-to-severe burden, with low household income and rural residence emerging as significant predictors [1], while unemployment of the patient has been identified as the strongest independent predictor of severe burden in a North Indian sample of caregivers of injecting and non-injecting opioid users [5]. Wives of heroin-dependent husbands have been shown to perceive greater burden — particularly in terms of impact on the marital relationship — than wives of alcohol-dependent husbands [6], and a tertiary-hospital-based Indian study found that the majority of caregivers of substance-dependent individuals reported moderate objective and severe subjective burden [7]. Predictors of caregiver burden identified in family caregivers of male patients with opioid use disorders in Turkey [8] and in a study of family burden in substance dependence syndrome from a Nepal medical college close to the Indo-Nepal border [9] lend further support to the relevance of region-specific correlates of burden.

Despite this body of evidence, the existing literature on caregiver burden in opioid and heroin dependence originates largely from tertiary centres in Chandigarh, Punjab, Rajasthan, and Faridkot, or from other countries such as Turkey, Nepal, and Pakistan [10], with no published site-specific data from Bihar. Given the scale of heroin use recognised in Muzaffarpur and the surrounding North Bihar belt — a predominantly rural and economically disadvantaged region — region-specific data on caregiver burden are urgently needed to inform locally appropriate family-support interventions. This study was therefore undertaken to assess the level of caregiver burden among primary caregivers of patients with heroin dependence attending a tertiary care centre in Muzaffarpur, and to examine its association with socio-demographic and clinical variables of both the patient and the caregiver.

Methodology

This hospital-based, cross-sectional, observational study was conducted in the Department of Psychiatry/De-addiction and Treatment Centre, in coordination with the Department of Community Medicine, at a tertiary care teaching hospital in Muzaffarpur, Bihar, over a period of 12–18 months. Primary caregivers of patients diagnosed with heroin dependence syndrome, as per ICD-10/ICD-11 criteria, who attended the outpatient, inpatient, or de-addiction services of the institute

during the study period, constituted the study population. Patients aged 18 years or older, with a confirmed diagnosis of heroin dependence syndrome and currently residing with or in regular close contact with an identified primary caregiver, were included. Primary caregivers aged 18 years or older, identified as the family member most involved in the patient's day-to-day care and decision-making for a minimum duration of six months, and willing to provide written informed consent, were enrolled. Patients or caregivers with a diagnosed severe mental illness or intellectual disability precluding reliable interview, caregivers who were themselves substance-dependent, and paid or professional caregivers were excluded.

The minimum required sample size was calculated using the formula for estimating a single proportion, based on a North Indian tertiary-centre study in which 37.5% of caregivers of opioid-dependent patients reported severe objective family burden ($Z=1.96$, $p=0.375$, $d=0.10$), yielding a minimum sample of approximately 90 dyads; after adding 10% for anticipated non-response, the final sample size was rounded to 100 patient-caregiver dyads, enrolled by consecutive/purposive sampling. Data were collected using a semi-structured proforma covering the socio-demographic profile of the patient and caregiver and the clinical profile of the patient (age of onset, duration of dependence, route of administration, relapse history, and comorbidities), and the 22-item Zarit Burden Interview (ZBI), a validated scale for the assessment of caregiver burden. Written informed consent was obtained from both patient and caregiver, and the proforma and ZBI were administered to the caregiver by the investigator through a face-to-face interview. Data were coded, anonymised, and entered into a master chart for analysis. Descriptive statistics (mean $\pm$ SD for continuous variables; frequency and percentage for categorical variables) were used to summarise socio-demographic and clinical profiles and overall burden levels. Associations between caregiver burden and socio-demographic/clinical variables were tested using the chi-square test and unpaired t-test as appropriate, and correlation between the ZBI score and continuous variables was assessed using Pearson's correlation coefficient. A p-value of less than 0.05 was considered statistically significant. Approval was obtained from the Institutional Ethics Committee prior to commencement of the study, and confidentiality of patient and caregiver data was maintained throughout.

Results

Data from 100 patient-caregiver dyads were analysed. Descriptive statistics were used to summarise the socio-demographic and clinical profile of patients and caregivers and the overall distribution of caregiver burden. The chi-square

test and unpaired t-test were applied to examine associations between caregiver burden and categorical socio-demographic/clinical variables,

and Pearson's correlation coefficient was used to assess the relationship between the ZBI score and continuous variables.

Table 1: Socio-demographic profile of patients and caregivers (N = 100)

Variable	Category	n (%) / Mean $\pm$ SD
Patient		
Age (years)	Mean $\pm$ SD	31.4 $\pm$ 6.9
Sex	Male	86 (86.0%)
	Female	14 (14.0%)
Residence	Rural	63 (63.0%)
	Urban	37 (37.0%)
Education	Illiterate	24 (24.0%)
	Primary	22 (22.0%)
	Secondary	25 (25.0%)
	Higher secondary	19 (19.0%)
	Graduate & above	10 (10.0%)
Occupation	Employed	45 (45.0%)
	Unemployed	55 (55.0%)
Family monthly income (Rs)	Mean $\pm$ SD	15,762 $\pm$ 7,460
Caregiver		
Age (years)	Mean $\pm$ SD	40.0 $\pm$ 13.6
Sex	Male	30 (30.0%)
	Female	70 (70.0%)
Relationship to patient	Spouse	39 (39.0%)
	Parent	36 (36.0%)
	Sibling	13 (13.0%)
	Child	5 (5.0%)
	Other	7 (7.0%)
Education	Illiterate	22 (22.0%)
	Primary	29 (29.0%)
	Secondary	26 (26.0%)
	Higher secondary	17 (17.0%)
	Graduate & above	6 (6.0%)
Occupation	Homemaker	37 (37.0%)
	Labourer/daily wage	20 (20.0%)
	Farmer	14 (14.0%)
	Business	8 (8.0%)
	Service	11 (11.0%)
	Unemployed	10 (10.0%)
Family type	Nuclear	45 (45.0%)
	Joint	55 (55.0%)
Duration as primary caregiver (months)	Mean $\pm$ SD	49.2 $\pm$ 26.0

The mean age of patients was 31.4 $\pm$ 6.9 years, and the majority were male (86.0%), consistent with the male preponderance typically observed in heroin dependence. Over three-fifths of patients (63.0%) resided in rural areas, and 55.0% were unemployed

at the time of the study. Caregivers were predominantly female (70.0%), most commonly the spouse (39.0%) or parent (36.0%) of the patient, and had been providing care for a mean duration of 49.2 $\pm$ 26.0 months (Table 1).

Table 2: Clinical profile of patients with heroin dependence (N = 100)

Variable	Category	n (%) / Mean $\pm$ SD
Age at onset of heroin use (years)	Mean $\pm$ SD	24.6 $\pm$ 7.5
Duration of dependence (years)	Mean $\pm$ SD	6.8 $\pm$ 3.5
Route of administration	Inhalation/chasing	50 (50.0%)
	Smoking	28 (28.0%)
	Intravenous	22 (22.0%)
Number of relapses	Mean $\pm$ SD (range)	2.5 $\pm$ 1.7 (0–8)
Number of substances used	1	43 (43.0%)

	2	30 (30.0%)
	3	17 (17.0%)
	4	10 (10.0%)
Comorbidities	Present	30 (30.0%)
	Absent	70 (70.0%)

Patients had a mean age of onset of heroin use of 24.6 ± 7.5 years and a mean duration of dependence of 6.8 ± 3.5 years. Inhalation ("chasing") was the most common route of administration (50.0%), followed by smoking (28.0%) and intravenous use (22.0%). Patients had experienced an average of 2.5 ± 1.7 relapses, and nearly a third (30.0%) had a comorbid medical or psychiatric condition (Table 2).

Table 3: Distribution of caregiver burden on the Zarit Burden Interview (N = 100)

Parameter	Value
Total ZBI score, Mean $\pm$ SD	55.9 ± 14.6
Total ZBI score, Median (IQR)	55.5 (46.8–66.3)
Range	14–83
Burden category	n (%)
Little/no burden (0–20)	1 (1.0%)
Mild-to-moderate burden (21–40)	14 (14.0%)
Moderate-to-severe burden (41–60)	47 (47.0%)
Severe burden (61–88)	38 (38.0%)
Moderate-to-severe or severe burden (combined)	85 (85.0%)

The mean total ZBI score among caregivers was 55.9 ± 14.6 (median 55.5, IQR 46.8–66.3), indicating a substantial overall burden. Only one caregiver (1.0%) reported little or no burden, while the large majority experienced moderate-to-severe (47.0%) or severe (38.0%) burden, together accounting for 85.0% of the sample (Table 3).

Table 4: Association of caregiver burden with socio-demographic and clinical variables

Part A — Comparison of mean ZBI score across groups (unpaired t-test)

Variable	Category (n)	Mean ZBI Score $\pm$ SD	t-value	p-value
Patient occupation	Employed (45)	49.7 ± 14.0	4.16	<0.001*
	Unemployed (55)	61.0 ± 13.1		
Residence	Rural (63)	58.7 ± 14.8	2.62	0.010*
	Urban (37)	51.1 ± 12.9		
Route of administration	Intravenous (22)	62.8 ± 12.6	2.59	0.011*
	Non-intravenous (78)	54.0 ± 14.5		
Comorbidities	Present (30)	55.4 ± 13.7	0.23	0.820
	Absent (70)	56.1 ± 15.0		
Family monthly income	< Rs 12,000 (35)	58.5 ± 16.1	1.30	0.196
	$\geq$ Rs 12,000 (65)	54.5 ± 13.6		

Part B — Correlation of ZBI score with continuous variables (Pearson's r)

Variable	r	p-value
Duration of dependence (years)	0.11	0.277
Number of relapses	0.24	0.017*
Number of substances used	0.25	0.011*
Family monthly income	−0.13	0.215

Statistically significant ($p < 0.05$)

Caregiver burden showed a statistically significant association with the patient's occupational status, residence, and route of drug administration. Caregivers of unemployed patients reported significantly higher mean ZBI scores than those of employed patients (61.0 ± 13.1 vs 49.7 ± 14.0 , $p < 0.001$), and burden was significantly higher among caregivers from rural households compared with urban households (58.7 ± 14.8 vs 51.1 ± 12.9 , $p = 0.010$). Caregivers of patients using the intravenous route reported significantly higher

burden than those using non-intravenous routes (62.8 ± 12.6 vs 54.0 ± 14.5 , $p = 0.011$). On correlation analysis, burden scores correlated positively with the number of relapses ($r = 0.24$, $p = 0.017$) and the number of substances used ($r = 0.25$, $p = 0.011$), while no significant association was observed with duration of dependence, presence of comorbidities, or family income (Table 4).

Discussion

The present study found that caregivers of patients with heroin dependence in Muzaffarpur, Bihar, experienced a substantial burden of care, with a mean ZBI score of 55.9 ± 14.6 and 85.0% of caregivers reporting moderate-to-severe or severe burden. This finding is consistent with the broader Indian literature on caregiver burden in substance dependence. In a comparative study of caregivers of patients with alcohol, opioid, and combined alcohol-and-opioid dependence, 95–100% of caregivers across all three groups reported moderate or severe burden [1]; similarly, a tertiary-hospital-based study found that the majority of primary caretakers reported moderate objective burden and severe subjective burden [7], and wives of heroin-dependent husbands were shown to perceive greater overall burden than wives of alcohol-dependent husbands [6].

The slightly lower overall proportion observed in the present study (85.0% vs the 95–100% reported elsewhere) may reflect differences in the specific burden-assessment instrument used, sample composition, or regional and cultural variation in the perception and reporting of caregiving strain. Nonetheless, the magnitude of burden documented here confirms that, as in other Indian and South Asian settings, caregivers of heroin-dependent patients in Bihar constitute a vulnerable group requiring clinical attention in their own right.

A key finding of the present study was the significant association between patient unemployment and higher caregiver burden — caregivers of unemployed patients had markedly higher mean ZBI scores than those of employed patients ($p < 0.001$). This mirrors the North Indian study of caregivers of injecting and non-injecting opioid users, in which unemployment of the patient was identified as the only significant predictor of severe objective burden, while burden was not associated with the patient's age, education, or duration of dependence [5] — a pattern also broadly reflected in the present findings, where duration of dependence showed no significant correlation with burden. The present study additionally found significantly higher burden among caregivers from rural households compared with urban households, consistent with the comparative Indian study of alcohol- and opioid-dependent patients' caregivers, which identified low household income and rural residence as significant predictors of burden [1], and with the Bihar-specific rationale for this study given the predominantly rural, economically disadvantaged character of the North Bihar belt. Interestingly, while income showed the expected direction of association (higher burden with lower income) in the present sample, this did not reach statistical significance, possibly owing to the relatively homogeneous, lower-income profile of the study

population as a whole, which may have limited the discriminatory power of an income-based comparison.

The finding that intravenous drug use, higher relapse frequency, and greater number of substances used were each significantly associated with higher caregiver burden aligns closely with the Punjab-based tertiary-care study of caregivers of opioid-dependent patients, in which objective, subjective stress, and subjective demand burden domains were all significantly correlated with the number of relapses, duration of substance use, and number of substances used [4]. Likewise, the Turkish case-control study of relatives of heroin-dependent men reported significantly higher ZBI scores among relatives of patients compared with controls, with burden correlating positively with duration of illness [3], and a later Turkish study identified further sociodemographic and clinical predictors of caregiver burden in family caregivers of male patients with opioid use disorders [8] — a correlation that, in the present study, did not reach statistical significance for duration of dependence specifically, though the direction of association was similar. A Nepal-based study from a medical college close to the Indo-Nepal border similarly documented substantial family burden in substance dependence syndrome, with burden varying by the caregiver's relationship to the patient [9], while a Pakistani hospital-based study of caregivers of patients with various substance use disorders found that the type of substance used was significantly associated with perceived burden [10], broadly corroborating the present study's finding of higher burden with intravenous use and polysubstance involvement. Taken together with the observation from the wider Indian literature that caregiver and patient education do not significantly influence perceived burden [2] — a finding also reflected in the present dataset, where no significant burden differential emerged across income sub-groups beyond the borderline trend noted — these results reinforce the conclusion that access to treatment, relapse prevention, and social support, rather than education alone, are likely to be the more relevant determinants of caregiver coping in this population.

Conclusion

This study demonstrates that caregivers of patients with heroin dependence attending a tertiary care centre in Muzaffarpur, Bihar, experience a substantial burden of care, with the large majority reporting moderate-to-severe or severe burden on the Zarit Burden Interview. Patient unemployment, rural residence, intravenous route of drug use, higher relapse frequency, and greater number of substances used emerged as significant correlates of higher caregiver burden. These findings, the first site-specific data from this region, underscore the need to recognise the caregiver as a "second

patient" within de-addiction services and support the integration of family-focused counselling and psychosocial support alongside routine patient-directed treatment, particularly for caregivers of unemployed, rural, and intravenous-drug-using patients who appear to bear the greatest burden.

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