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Original Research Article

PREVALENCE OF DYSLIPIDEMIA AND ITS ASSOCIATION WITH SOCIODEMOGRAPHIC FACTORS AMONG STUDENTS OF THE UNIVERSITY OF ALLAHABAD IN NORTHERN INDIA: A CROSS-SECTIONAL STUDY

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ABSTRACT

Background: Dyslipidemia is a major modifiable risk factor for cardiovascular disease and is increasingly detected among young adults, including university students, in whom sociodemographic and lifestyle transitions converge. Indian data describing the sociodemographic epidemiology of dyslipidemia within university populations remain limited.
Objectives: To describe the sociodemographic profile of students of a central university in Prayagraj, to determine the prevalence of dyslipidemia, and to evaluate its association with sociodemographic factors.
Materials and Methods: A cross-sectional study was conducted among 280 students aged 18–30 years at the University of Allahabad, Prayagraj, from February 2025 to January 2026. A multistage random sampling technique with proportionate allocation was used to select participants across faculties, disciplines and academic years. Sociodemographic data were collected using a pre-structured questionnaire, and a fasting lipid profile was estimated for each participant. Dyslipidemia was defined as per National Cholesterol Education Program Adult Treatment Panel III (NCEP-ATP III) criteria. Associations were tested using the chi-square test, with $p<0.05$ considered significant.
Results: Most participants were aged 18–25 years (73.9%), male (63.6%), Hindu (83.9%), from middle socioeconomic strata (Class III–IV, 70.4%), resident in university hostels (68.2%), and of urban origin (58.6%). The overall prevalence of dyslipidemia was 28.2% (79/280). Prevalence was numerically higher among participants aged 26–30 years (35.6%) than 18–25 years (25.6%; $\chi^2=2.67$, $p=0.102$), and among females (30.4%) than males (27.0%; $\chi^2=0.38$, $p=0.540$), but neither association was statistically significant. Socioeconomic status also showed no significant association with dyslipidemia ($\chi^2=2.71$, $p=0.608$).
Conclusion: Nearly three in ten university students had dyslipidemia despite the absence of a statistically significant sociodemographic determinant, supporting universal rather than sociodemographically-targeted lipid screening within university health services.
Keywords: Dyslipidemia; Prevalence; Sociodemographic factors; University students; Cross-sectional study; NCEP-ATP III; India.

INTRODUCTION

Cardiovascular diseases (CVDs) remain the leading cause of death and disability worldwide, and dyslipidemia — characterised by abnormal concentrations of total cholesterol, low-density lipoprotein cholesterol (LDL-C), high-density lipoprotein cholesterol (HDL-C), or triglycerides — is one of the most important modifiable risk factors underlying this burden.[1,2] Epidemiological transition, driven by urbanisation, dietary change, and declining physical activity, has progressively shifted lipid abnormalities and atherosclerotic risk toward younger age groups.[3,4]

India has witnessed a well-documented rise in dyslipidemia prevalence over the past two decades, reflected in successive nationwide and regional surveys.[5,6] However, this evidence is drawn largely from general adult, occupational, or hospital-based cohorts; community-based data describing dyslipidemia specifically within Indian university populations remain limited. University students constitute a distinct and increasingly studied sub-population in the global literature, since entry into university life is frequently accompanied by hostel residence, irregular meal timing, greater reliance on fast food, academic stress, and reduced physical activity — a cluster of changes that creates a metabolic environment conducive to early lipid abnormality.[7,8] Because dyslipidemia is largely asymptomatic, abnormalities that begin during this transitional phase often go undetected and may persist or progress into later adulthood, making the university years a critical window for screening.

The relationship between sociodemographic characteristics and dyslipidemia has, however, been inconsistent across the available literature, with age, gender, socioeconomic status, and residential setting showing variable associations depending on the population studied.[9] Given this inconsistency, and the sociodemographic diversity typical of a large public university, a systematic description of the student sociodemographic profile alongside a robust prevalence estimate is a necessary precursor to any targeted screening or risk-reduction programme.

Against this background, the present study was undertaken among students of a central university in Prayagraj, Uttar Pradesh, with the objectives of (i) describing the sociodemographic profile of the study population, (ii) determining the prevalence of dyslipidemia among students, and (iii) evaluating the association between sociodemographic factors and dyslipidemia.

MATERIALS AND METHODS

Study Design and Setting

This community-based cross-sectional study was conducted at the University of Allahabad, Prayagraj, Uttar Pradesh — one of India's oldest central universities, comprising four faculties (Arts, Commerce, Law and Science) and an approximate student strength of 17,000–18,000 across undergraduate, postgraduate and doctoral programmes.

Study Duration

Data were collected over a period of one year, from 1 February 2025 to 31 January 2026.

Study Population, Inclusion and Exclusion Criteria

The study population comprised students aged 18–30 years enrolled in undergraduate, postgraduate, or doctoral programmes at the university during the study period. Students who were enrolled during the study period, aged 18–30 years, and willing to provide written informed consent were included. Pregnant students; those on lipid-altering medication (statins/fibrates); those with a known chronic disease affecting lipid metabolism (diabetes mellitus, hypothyroidism, hyperthyroidism, chronic liver or kidney disease); and those too unwell to participate at the time of data collection were excluded.

Sample Size

The sample size was estimated using an expected prevalence of dyslipidemia of 38.44% among young adults aged 18–30 years, based on a previously reported Indian prevalence estimate for this age group. At 95% confidence (Z=1.96) and a relative allowable error of 15% of the expected prevalence (d = 0.15 × 0.3844 = 0.0577), the minimum calculated sample size using the standard formula for prevalence studies ($n = Z^2P(1-P)/d^2$) was approximately 273. After adding 10% for anticipated non-response, the target sample size was 300. Of these, 20 participants (6.7%) declined venous blood sampling, yielding a final analytic sample of 280.

Sampling Technique

A multistage random sampling technique with proportionate allocation at the final stage was used to select study participants (Figure 1).

Stage I: A complete list of the four faculties of the university (Arts, Commerce, Law, Science) was prepared, and two faculties — the Faculty of Arts and the Faculty of Science — were selected by simple random sampling using the lottery method.

Stage II: From each selected faculty, two disciplines were selected at random — Hindi and Sociology from the Faculty of Arts, and Mathematics and Biology from the Faculty of Science.

Stage III: Within each selected discipline, all academic years (UG 1st, 2nd and 3rd year; PG 1st and 2nd year; and PhD) were included in the sampling frame, and a pooled list of enrolled students across all years was obtained from the respective departments for each of the four disciplines.

A proportionate stratified random sampling technique was then applied, treating each of the four selected disciplines as an independent stratum. The number of students selected from stratum i (n_i) was calculated using the formula $n_i = (N_i/N) \times n$, where N_i is the total enrolment in the i-th discipline, N is

the combined enrolment across the four selected disciplines (Hindi = 2684; Sociology = 957; Mathematics = 1229; Biology = 1345), and n is the overall target sample size (300). This yielded 130 students from Hindi, 46 from Sociology, 59 from Mathematics, and 65 from Biology. Of these, 8, 2, 6 and 4 students respectively declined blood sampling, leaving a final analytic sample of 280 participants, as summarised in Figure 1.

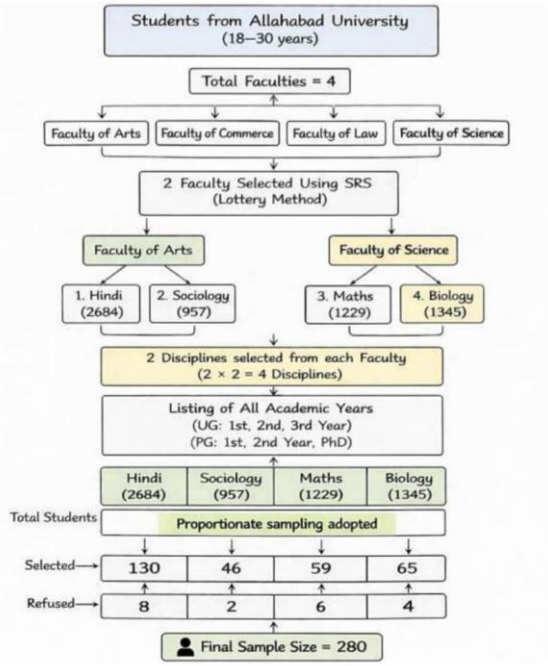

Figure 1: Multistage random sampling technique used for selection of study participants (Final sample size = 280)

Data Collection

All selected students who consented were administered a pre-structured, pre-validated questionnaire covering sociodemographic profile, dietary habits, physical activity, tobacco and alcohol use, sleep, and perceived stress (Cohen's Perceived Stress Scale-10). Approximately 5 mL of fasting venous blood was collected from the antecubital vein after an 8–12 hour overnight fast, under aseptic precautions, and analysed on a fully automated biochemistry analyser (Erba EM-200). Total cholesterol, triglycerides and HDL-C were estimated by enzymatic colorimetric methods (CHOD-PAP and GPO-PAP); LDL-C and VLDL-C were derived using the Friedewald formula.

Operational Definitions

Dyslipidemia was defined, as per NCEP-ATP III criteria, as the presence of one or more of the following abnormalities in the fasting lipid profile: total cholesterol ≥240 mg/dl, LDL-cholesterol ≥160 mg/dl, HDL-cholesterol <40 mg/dl in males or <50 mg/dl in females, and/or triglycerides ≥150 mg/dl. Socioeconomic status was classified using the Modified BG Prasad Scale (2024 update). Urban and rural place of origin were defined as per Census of India criteria.

Statistical Analysis

Data were entered in Microsoft Excel and analysed using SPSS version 20. Categorical variables were summarised as frequencies and percentages. The chi-square test was used to test associations between sociodemographic variables and dyslipidemia status; a p-value <0.05 was considered statistically significant.

Ethical Considerations

The study was approved by the Institutional Ethics Committee. Written informed consent was obtained from all participants prior to enrolment, and confidentiality of participant data was maintained throughout the study.

RESULTS

A total of 280 students were included in the final analysis. Table 1 presents the sociodemographic profile of the study population; the majority of participants were aged 18–25 years, male, Hindu by religion, belonged to middle socioeconomic strata, resided in university hostels, and originated from urban areas.

Table 1: Sociodemographic profile of study participants (N=280)

Variable	Category	n	%
Age group (years)	18–25	207	73.9
	26–30	73	26.1
Gender	Male	178	63.6
	Female	102	36.4
Religion	Hindu	235	83.9
	Muslim	37	13.2
	Others	8	2.9
Socioeconomic status*	Class I	17	6.1
	Class II	37	13.2
	Class III	92	32.9
	Class IV	105	37.5
	Class V	29	10.4
Residence status	University hostel	191	68.2
	Private rental	67	23.9
	Living with family	22	7.9
Place of origin	Urban	164	58.6
	Rural	116	41.4
Total	—	**280**	**100.0**

**Modified BG Prasad Scale, 2024 update.*

Table 2 summarises the distribution of individual fasting lipid parameters by gender. Optimal LDL-C was seen in 82.5% of participants, normal HDL-C in 83.6%, normal triglycerides in 77.5%, and normal total cholesterol in 86.4%, with broadly similar patterns across genders.

Table 2: Distribution of fasting lipid profile parameters by gender (N=280)

Parameter	Category	Male n (%)	Female n (%)	Total n (%)
LDL-C	Optimal (<160 mg/dl)	146 (82.0)	85 (83.3)	231 (82.5)
	High (≥160 mg/dl)	32 (18.0)	17 (16.7)	49 (17.5)
HDL-C	Normal	149 (83.7)	85 (83.3)	234 (83.6)
	Low (<40/<50 mg/dl)†	29 (16.3)	17 (16.7)	46 (16.4)
Triglycerides	Normal (<150 mg/dl)	138 (77.5)	79 (77.5)	217 (77.5)
	High (≥150 mg/dl)	40 (22.5)	23 (22.5)	63 (22.5)
Total cholesterol	Normal (<240 mg/dl)	153 (86.0)	89 (87.3)	242 (86.4)
	High (≥240 mg/dl)	25 (14.0)	13 (12.7)	38 (13.6)
Column total	—	**178 (100)**	**102 (100)**	**280 (100)**

†HDL-C cut-off: <40 mg/dl in males, <50 mg/dl in females.

The overall prevalence of dyslipidemia, defined as an abnormality in one or more lipid parameters, was 28.2%. [Table 3]

Table 3: Overall prevalence of dyslipidemia among study participants (N=280)

Status	n	%
Dyslipidemia present	79	28.2
Dyslipidemia absent	201	71.8
Total	**280**	**100.0**

Table 4 presents the association between the sociodemographic variables tested (age group, gender and socioeconomic status) and dyslipidemia status. Dyslipidemia prevalence was numerically higher in the 26–30-year age group and among females and Class II participants, but none of these differences reached statistical significance on chi-square testing. Religion, residence status, and place of origin are described in Table 1 but could not be formally tested for association with dyslipidemia because of limited sub-group sizes in several strata.

Table 4: Association between sociodemographic factors and dyslipidemia among study participants (N=280)

Variable	Category	Dyslipidemia present n (%)	Dyslipidemia absent n (%)	χ^2	p-value
Age group	18–25 yrs	53 (25.6)	154 (74.4)	2.67	0.102
	26–30 yrs	26 (35.6)	47 (64.4)		
Gender	Male	48 (27.0)	130 (73.0)	0.38	0.540
	Female	31 (30.4)	71 (69.6)		
Socioeconomic status	Class I	4 (23.5)	13 (76.5)	2.71	0.608
	Class II	14 (37.8)	23 (62.2)		
	Class III	26 (28.3)	66 (71.7)		
	Class IV	29 (27.6)	76 (72.4)		
	Class V	6 (20.7)	23 (79.3)		
Total	—	**79 (28.2)**	**201 (71.8)**	—	—

DISCUSSION

The present study found an overall dyslipidemia prevalence of 28.2% among university students in Prayagraj, with roughly three in ten students showing at least one abnormal lipid parameter despite the apparent absence of overt clinical risk. This figure sits within the wide range reported from Indian community and university-linked cohorts and is appreciably lower than several international university-based estimates, a pattern discussed by sociodemographic sub-group below.

Age

The majority of participants (73.9%) were in the 18–25 year age band, consistent with the typical age structure of an undergraduate-dominated university population, similar to the age distribution reported by Liu et al. among more than 20,000 Chinese university students,[7] and by Pootong et al. among Thai university students, all of whom were 18–25 years old.[10] Dyslipidemia prevalence was numerically higher in the 26–30 year group (35.6%) than in the 18–25 year group (25.6%), a direction consistent with Liu et al., who reported that lipid components began rising from age 22 with a marked increase after age 30,[7] although in the present study this difference did not reach statistical significance (χ^2=2.67, p=0.102). This suggests that while lipid abnormality may begin accumulating even within the narrow age band typical of a student population, larger samples may be required to demonstrate a statistically robust age gradient in this setting.

Gender

Males constituted the majority of the sample (63.6%), reflecting the gender distribution of the faculties and disciplines sampled. Dyslipidemia was

marginally more common among females (30.4%) than males (27.0%), but the association was not statistically significant (χ^2=0.38, p=0.540). This contrasts with the pronounced male excess reported in several other university cohorts: Liu et al. found a markedly higher prevalence among male than female Chinese university students (23.0% vs 7.2%),[7] and Alvarez Ramírez et al. similarly reported that male sex was significantly associated with hyperlipidemia among Colombian university students.[11] It is, however, broadly in line with Saeed et al., who reported no significant association between dyslipidemia and several sociodemographic and occupational variables among young adults in Pakistan.[12] This divergence across settings suggests that gender-based differences in lipid profile among young adults are shaped as much by population-specific behavioural exposures — such as smoking and alcohol use, both more common among males in several of these cohorts — as by biological sex per se, and should not be assumed to generalise uniformly across university populations.

Socioeconomic Status

Most participants belonged to the middle socioeconomic strata (Class III–IV, 70.4% combined by the Modified BG Prasad Scale), and socioeconomic status showed no statistically significant association with dyslipidemia in this study (χ^2=2.71, p=0.608), with abnormal lipid profiles observed across all five classes. This contrasts with Hudson et al., who found that higher socioeconomic and educational status was associated with a more favourable lipid profile among American college students,[9] suggesting that the socioeconomic-lipid relationship may depend on setting-specific factors — such as differential access to health-promoting food — rather than being a universal determinant. A similarly null sociodemographic association has, however, been reported in a very different Indian setting: Mallikarjuna Majgi et al., in a community-based study among tribal and rural populations of south India, recorded a markedly higher dyslipidemia prevalence (85.7%) than observed here, yet found no significant sociodemographic predictor of dyslipidemia specifically, even though age and wealth index did predict co-existing hypertension in the same cohort.[13] Taken together, these contrasting observations suggest that dyslipidemia risk in the present university cohort is unlikely to be explained by socioeconomic profiling alone.

Residence Status

Over two-thirds of participants (68.2%) resided in university hostels, a setting that involves shared mess facilities, irregular meal timing, and easy access to nearby fast-food outlets — plausible contributors to lipid abnormality that are distinct from, though related to, urban-versus-rural residence. Residence status itself could not be formally tested for association with dyslipidemia in this study because of limited power within the smaller residential strata (private rental and family-resident groups); most published comparators to date have examined urban-versus-rural residence rather than hostel-versus-non-hostel living specifically, so this remains an important gap for future, adequately powered university-based studies to address.

Place of Origin (Urban/Rural)

Approximately three-fifths of participants (58.6%) originated from urban areas. Urban origin and residence have consistently been linked with a higher dyslipidemia burden in Indian and international literature. Among university students specifically, Abdel Wahed et al. reported a prevalence of 63.8% in Fayoum, Egypt, with urban residence among the significant associated factors, alongside physical inactivity and frequent fast-food intake.[14] Similarly, Xi et al. reported an age-standardised prevalence of 31.2% among adults in northern China, significantly associated with urban residence among other factors,[15] and Gao et al. reported a higher overall prevalence of 48.27% among residents of Shenmu City, China, again linked to urban or industrial residence.[16] Within India, Prabhakaran et al., reporting from the PURE study, found significantly higher total cholesterol, LDL-C and triglycerides among urban compared with rural Indian populations,[17] and Gupta et al., in successive Jaipur Heart Watch surveys of urban North India, documented a rise in hypercholesterolemia from approximately 23% to more than 35% and in hypertriglyceridemia from about 20% to nearly 33% across successive survey rounds.[18] The predominantly urban origin of students in the present cohort may therefore itself be contributing to the overall prevalence observed, independent of any specific effect of university or hostel life.

Overall Prevalence in the Indian Context

The prevalence observed here (28.2%) is lower than the 49.9% reported among 3,227 young adults aged 18–25 years in Delhi-NCR by Choudhury et al,[19] and substantially lower than the 85% (urban/sub-urban) and 78.5% (rural) prevalence reported among South Indian adults by Mohanraj et al., in whose cohort age, gender, alcohol use, obesity, diabetes and hypertension were all significant predictors of dyslipidemia,[20] — a marked contrast with the absence of any significant sociodemographic association in the present, younger and more homogenous student cohort. The prevalence in the present study is, however, broadly consistent with the rising trend in dyslipidemia documented across successive Indian surveys, including the nationwide ICMR–INDIAB study,[6] and recent reviews of Indian epidemiological trends.[5] The comparatively lower prevalence here may partly reflect the younger, more homogenous age structure of a student population relative to general community samples, as well as differences in dietary and lifestyle exposure between a university and a general adult population.

Taken together, these findings suggest that while sociodemographic factors — age, gender, and socioeconomic status — did not independently predict dyslipidemia in this university cohort, the underlying prevalence remains substantial and is shaped by the broader urban, hostel-based context of university life rather than by any single sociodemographic characteristic in isolation. This has a direct bearing on how screening should be organised: rather than targeting specific sociodemographic sub-groups, the findings support universal lipid screening for all students irrespective of age, gender, or socioeconomic background.

Strengths and Limitations

This study benefits from a robust multistage random sampling design with proportionate allocation, a reasonable sample size derived from a formal calculation, and biochemically confirmed lipid estimation rather than self-reported data, which together strengthen the internal validity of the prevalence estimate. Limitations include the cross-sectional design, which precludes causal inference; the restriction to two faculties and four disciplines of a single university, which may limit generalisability to the wider student population; and the modest cell sizes in some sociodemographic strata (for example, religion and place of origin), which limited the statistical power available to detect associations that may nonetheless be clinically relevant.

CONCLUSION

Nearly three in ten students (28.2%) in this university-based cross-sectional study had dyslipidemia, despite a predominantly young, urban, hostel-residing sociodemographic profile in which age, gender, and socioeconomic status showed no statistically significant independent association with lipid abnormality. These findings support the introduction of routine, universal lipid screening within university health services, rather than screening restricted to sociodemographically defined high-risk sub-groups, and highlight the need for larger multi-centric studies to clarify the role of residence status and place of origin in this population.

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