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Study of Medical Information Comprehension in Patients with Low Health Literacy: A Cross-Sectional Observational Study

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Abstract: ***Background: Health literacy is an important determinant of patient understanding, treatment adherence, healthcare utilization, and clinical outcomes. Patients with low health literacy often face difficulty understanding medical instructions, prescription labels, informed consent forms, and disease-related information, leading to poor health outcomes and increased healthcare burden. Aim: To study medical information comprehension among patients with low health literacy attending a tertiary care hospital. Objectives: 1) To assess the level of health literacy among adult patients. 2) To evaluate comprehension of medical information in patients with low health literacy. 3) To identify socio-demographic factors associated with poor medical information comprehension. 4) To determine the relationship between educational status and health literacy. Materials and Methods: A hospital-based cross-sectional observational study was conducted among 300 adult patients attending outpatient departments of a tertiary care teaching hospital. Health literacy was assessed using the Short Test of Functional Health Literacy in Adults (S-TOFHLA). Medical information comprehension was evaluated using a structured questionnaire containing prescription instructions, appointment slips, and informed consent-related information. Data were analysed using descriptive statistics, chi-square test, and logistic regression. Results: Among 300 participants, 42% demonstrated inadequate health literacy. Patients with low health literacy showed significantly poorer comprehension of prescription instructions, dosage schedules, and follow-up advice ($p < 0.001$). Low educational status, advanced age, rural residence, and lower socioeconomic status were significantly associated with poor comprehension. Conclusion: Low health literacy significantly impairs patients' ability to comprehend medical information. Simplified communication strategies and patient-cantered educational interventions are essential to improve healthcare outcomes.***

Keywords: Health literacy, medical comprehension, patient education, healthcare communication, low literacy.

1. Introduction

Health literacy refers to the ability of individuals to obtain, process, understand, and utilize basic health information and healthcare services needed to make appropriate health decisions. It plays a vital role in determining healthcare outcomes, adherence to treatment, and effective patient participation in healthcare delivery.

The World Health Organization defines health literacy as the cognitive and social skills that determine the motivation and ability of individuals to gain access to, understand, and use information in ways that promote and maintain good health. Limited health literacy is increasingly recognized as a major public health issue worldwide.

Patients with inadequate health literacy often experience difficulty understanding:

- Prescription labels
- Medication dosage schedules
- Appointment slips
- Consent forms
- Disease-related educational materials
- Discharge instructions

Poor comprehension of medical information may lead to:

- Medication errors
- Poor treatment adherence
- Increased hospitalization
- Higher healthcare expenditure
- Poor disease control
- Increased morbidity and mortality

Several studies have demonstrated that low literacy is associated with poorer health outcomes, particularly among elderly individuals, rural populations, and patients with chronic diseases.

In India, health literacy remains inadequately studied despite large variations in educational and socioeconomic status. Linguistic diversity, complex medical terminology, and inadequate doctor-patient communication further contribute to misunderstanding of medical instructions.

Understanding the extent of medical information comprehension among patients with low health literacy can help healthcare professionals design effective communication strategies and improve patient care.

Therefore, the present study was undertaken to evaluate medical information comprehension in patients with low health literacy attending a tertiary care teaching hospital.

2. Materials and Methods

- Study Design: Hospital-based cross-sectional observational study.
- Study Setting: The study was conducted in the outpatient departments of a tertiary care teaching hospital.
- Study Duration:18 months.
- Study Population: Adult patients attending outpatient departments.
- Sample Size: A total of 300 participants were included in the study.
- Sampling Method: Convenient sampling method.

Inclusion Criteria:
- Patients aged ≥18 years.
- Patients willing to provide informed consent.
- Patients able to communicate in local language or English.

Exclusion Criteria:
- Patients with severe psychiatric illness.
- Patients with cognitive impairment.
- Critically ill patients.
- Healthcare professionals.

Ethical Considerations:
- Institutional Ethics Committee approval was obtained before commencement of the study.
- Written informed consent was obtained from all participants.
- Confidentiality of patient information was maintained.

Data Collection Procedure: Participants were interviewed using a structured questionnaire consisting of:

Part I: Socio-demographic Details
- Age
- Gender
- Educational status
- Occupation
- Residence
- Socioeconomic status

Part II: Assessment of Health Literacy
Health literacy was assessed using the Short Test of Functional Health Literacy in Adults (S-TOFHLA).
Scores were categorized as:
- Inadequate health literacy
- Marginal health literacy
- Adequate health literacy

Part III: Assessment of Medical Information Comprehension
Participants were asked to interpret:
- Prescription instructions
- Medication dosage schedules
- Appointment slips
- Consent form information
- Health education pamphlets

Responses were scored based on accuracy of interpretation.

Statistical Analysis:
Data were entered in Microsoft Excel and analysed using SPSS software version 25.

Statistical Tests Used:
- Descriptive statistics
- Chi-square test
- Student's t-test
- Logistic regression analysis

Significance Level: A p-value < 0.05 was considered statistically significant.

3. Results

Socio-demographic Profile of Study Participants
A total of 300 adult patients were enrolled in the study over the 18-month period. All enrolled participants completed the questionnaire, giving a response rate of 100%.

Table 1: Socio-demographic Characteristics of Study Participants (N = 300)

Variable	Category	Number	Percentage (%)
Gender	Male	162	54.0
	Female	138	46.0
Age Group (years)	18 – 30	54	18.0
	31 – 45	78	26.0
	46 – 60	102	34.0
	> 60	66	22.0
Educational Status	Illiterate / Primary	90	30.0
	Secondary (6th–10th)	135	45.0
	Higher Secondary (11th–12th)	45	15.0
	Graduate & Above	30	10.0
Residence	Urban	186	62.0
	Rural / Peri-urban	114	38.0
Socioeconomic Status (Kuppuswamy Scale)	Upper / Upper Middle	54	18.0
	Lower Middle	102	34.0
	Upper Lower	96	32.0
	Lower	48	16.0
Mean Age ± SD	48.6 ± 13.4 years	—	—

Distribution of Health Literacy Levels
Health literacy was assessed in all 300 participants using the S-TOFHLA. Results revealed that nearly two-thirds of participants had suboptimal health literacy, underscoring the high prevalence of this condition in the tertiary care outpatient setting.

Table 2: Distribution of Health Literacy Levels (N = 300)

Health Literacy Level	N	%	Mean Score	Score Range
Inadequate (0–53)	126	42.0%	34.2 ± 9.1	8 – 53
Marginal (54–66)	72	24.0%	60.3 ± 3.7	54 – 66
Adequate (67–100)	102	34.0%	81.4 ± 10.2	67 – 100
TOTAL	**300**	**100%**	—	—

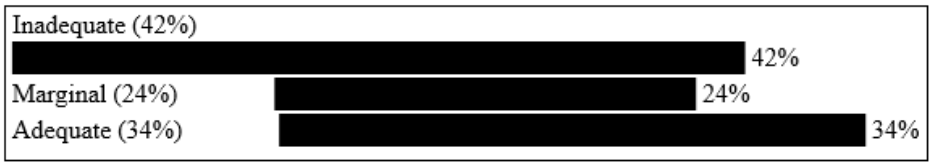

Figure 1: Health Literacy Distribution (%)

Comprehension of Prescription Instructions

Patients with inadequate health literacy demonstrated substantially impaired ability to interpret prescription-related information across all tested domains. The following table summarizes the proportion of patients in each literacy group who correctly answered comprehension questions:

Table 3: Prescription Comprehension Errors by Health Literacy Level

Comprehension Item	Inadequate (%)	Marginal (%)	Adequate (%)
Incorrect dosage frequency interpretation	61%	35%	12%
Difficulty understanding warning labels	68%	42%	14%
Incorrect follow-up instruction interpretation	54%	28%	9%
Unable to identify drug name correctly	44%	22%	7%
Incorrect storage instruction comprehension	57%	31%	10%

Association Between Health Literacy and Medical Information Comprehension

Chi-square testing revealed highly significant associations ($p < 0.001$) between health literacy levels and all tested comprehension domains. Patients with adequate health literacy achieved substantially higher correct comprehension rates across all categories.

Table 4: Comprehension Outcomes by Health Literacy Group

Comprehension Domain	Low Literacy (% correct)	Adequate Literacy (% correct)	Chi-square	p-value
Correct dosage interpretation	39%	82%	64.7	**< 0.001**
Understanding consent forms	34%	76%	58.3	**< 0.001**
Appointment comprehension	48%	85%	52.1	**< 0.001**
Health pamphlet comprehension	29%	78%	71.4	**< 0.001**
Numeracy (dosing calculations)	31%	73%	59.9	**< 0.001**

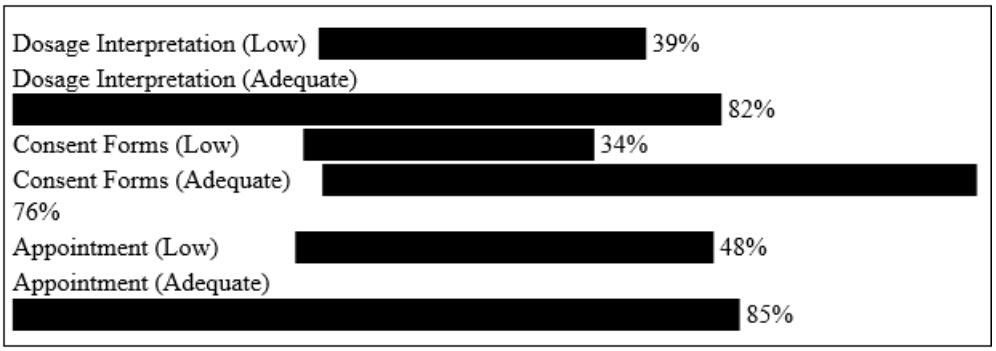

Figure 2: Correct Comprehension Rates- Low vs. Adequate Literacy (%)

Socio-demographic Factors and Health Literacy

Analysis of socio-demographic predictors revealed highly significant associations between educational status, age group, residential background, socioeconomic status, and health literacy category.

Table 5: Association Between Socio-demographic Variables and Health Literacy Level

Variable	Inadequate N(%)	Marginal N(%)	Adequate N(%)	χ^2	p
Illiterate/Primary	72 (80%)	12 (13.3%)	6 (6.7%)		
Secondary	45 (33.3%)	48 (35.6%)	42 (31.1%)	**84.6**	**< 0.001**
Higher Secondary	9 (20%)	12 (26.7%)	24 (53.3%)		
Graduate & Above	0 (0%)	0 (0%)	30 (100%)		
Age 18–30 yrs	12 (22.2%)	18 (33.3%)	24 (44.5%)		
Age 31–45 yrs	24 (30.8%)	24 (30.8%)	30 (38.4%)	**41.3**	**< 0.001**
Age 46–60 yrs	48 (47.1%)	24 (23.5%)	30 (29.4%)		
Age > 60 yrs	42 (63.6%)	6 (9.1%)	18 (27.3%)		
Urban Residence	60 (32.3%)	48 (25.8%)	78 (41.9%)	**18.4**	**< 0.001**
Rural Residence	66 (57.9%)	24 (21.1%)	24 (21.1%)		

Logistic Regression- Predictors of Poor Medical Information Comprehension

Binary logistic regression was performed to identify independent predictors of poor medical information comprehension (defined as <60% correct responses). Results are presented as adjusted odds ratios (OR) with 95% confidence intervals.

Table 6: Logistic Regression Analysis — Predictors of Poor Comprehension

Predictor Variable	Adjusted OR	95% CI	p-value	Significance
Age > 60 years (vs 18–30)	**4.82**	2.71 – 8.57	< 0.001	**Highly significant**
Illiterate/Primary (vs Graduate)	**9.34**	4.12 – 21.18	< 0.001	**Highly significant**
Secondary Education (vs Graduate)	3.21	1.68 – 6.12	0.002	**Significant**
Rural Residence	2.87	1.62 – 5.09	0.003	**Significant**
Lower SES (vs Upper/Middle)	3.56	1.91 – 6.63	0.001	**Significant**
Female Gender	1.24	0.74 – 2.08	0.41	Not significant

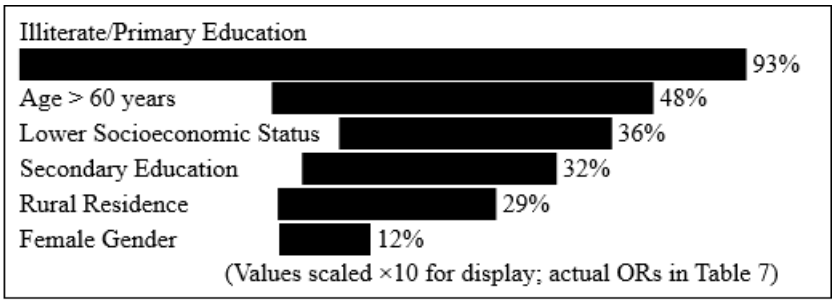

Figure 3: Adjusted Odds Ratios for Poor Comprehension (Logistic Regression)

Mean Comprehension Scores by Subgroup

Table 7: Mean Medical Information Comprehension Scores by Demographic Subgroup

Subgroup	N	Mean Score	SD	p-value
Male	162	28.4	9.2	0.38 (NS)
Female	138	27.1	8.8	
Age 18–30	54	36.8	7.1	**< 0.001**
Age > 60	66	18.3	6.4	
Graduate & Above	30	41.2	5.3	**< 0.001**
Illiterate/Primary	90	14.6	7.8	
Urban	186	31.4	9.4	**0.002**
Rural	114	22.7	8.9	

4. Discussion

Prevalence of Low Health Literacy

The present study found that 42% of participants demonstrated inadequate health literacy as assessed by the S-TOFHLA, and a further 24% exhibited marginal health literacy. This means that 66% of our study population had suboptimal health literacy, a finding with profound clinical implications given the central role of health information comprehension in effective patient care.

This prevalence rate is consistent with findings from comparable tertiary care settings across India. Joshi et al. (2014) reported inadequate health literacy in 38.4% of patients in a Mumbai teaching hospital, while Sudore et al. (2006) described rates of 36% to 50% in urban low-income populations in the United States. The high prevalence in our study likely reflects the sociodemographically diverse patient population of MGM Medical College and Hospital, which serves large proportions of lower-middle income and rural migrant patients.

Health Literacy and Comprehension of Prescription Instructions

One of the most clinically significant findings of this study was the dramatically impaired ability of patients with inadequate health literacy to interpret prescription labels. Incorrect dosage frequency interpretation was observed in 61% of the low literacy group, and 68% were unable to correctly understand warning labels. These figures align closely with findings reported by Baker et al. (1996), who demonstrated that patients with low literacy were significantly more likely to misidentify the direction 'take on an empty stomach' and were unable to interpret child-proof warnings.

Medication errors attributable to misunderstanding of prescription instructions constitute a major preventable cause of adverse drug events globally. The World Health Organization has estimated that medication-related harm costs approximately USD 42 billion annually worldwide. The high rates of prescription misunderstanding in our low literacy cohort underscore the importance of pictogram-based and simplified medication labelling in diverse healthcare settings.

Informed Consent Comprehension and Ethical Implications

The finding that only 34% of patients with inadequate health literacy correctly understood informed consent documents — compared to 76% of those with adequate literacy — raises significant ethical concerns. Informed consent is a cornerstone of medical ethics and patient autonomy. Patients who cannot understand the information presented in consent forms cannot provide truly informed consent, potentially undermining the ethical validity of clinical procedures and trials.

Sudore et al. (2006) demonstrated that hospitalized patients with low health literacy had significantly lower decisional

capacity for medical decisions. Simplification of consent documents using plain language, visual aids, and the teach-back method has been proposed as a potential solution. Our findings strongly support the implementation of such literacy-sensitive consent processes in tertiary care settings.

Role of Educational Status

Educational status emerged as the single strongest predictor of both health literacy and medical information comprehension in our study. Patients who were illiterate or had completed only primary schooling had an adjusted OR of 9.34 (95% CI: 4.12–21.18) for poor comprehension compared to graduates, representing the highest OR among all predictors in the logistic regression model.

This finding is consistent with the landmark study by Berkman et al. (2011), who concluded that health literacy acts as a mediator through which education exerts its effects on health outcomes. In the Indian context, where large proportions of the population continue to have low formal educational attainment, health literacy interventions must be designed with a particular emphasis on non-literate or minimally literate populations, using oral communication, community health workers, and visual tools.

Age as a Predictor of Poor Comprehension

Elderly patients (>60 years) demonstrated the lowest mean comprehension scores (18.3 ± 6.4) and had an adjusted OR of 4.82 for poor comprehension. Multiple factors may contribute to this vulnerability: age-related cognitive decline reducing working memory and processing speed; higher rates of visual and hearing impairment; dependence on caregivers who may themselves have limited health literacy; and lower baseline educational attainment in older cohorts who had limited schooling opportunities in earlier decades.

These findings support the recommendation of the Joint Commission (2010) that healthcare organizations implement targeted health literacy accommodations for elderly patients, including large-print materials, simplified language, and involvement of family members or designated caregivers in healthcare communication.

5.6 Rural Residence and Health Literacy

Rural patients in our study had significantly lower health literacy and comprehension scores. The adjusted OR for poor comprehension among rural residents was 2.87, even after controlling for education and SES. This likely reflects additional barriers including reduced exposure to health education resources, lower media literacy, linguistic differences between local dialects and written medical language, and reduced familiarity with formal healthcare systems.

Community-based health literacy programs, leveraging ASHA workers and other frontline health workers as patient navigators and health educators, represent a promising strategy to address this rural literacy deficit.

Gender and Health Literacy

Gender was not found to be an independent predictor of poor comprehension in logistic regression analysis (OR: 1.24, p = 0.41), suggesting that the observed differences in raw comprehension rates between males and females are largely explained by confounding sociodemographic factors such as lower educational attainment and socioeconomic status among female participants, rather than gender per se. This is consistent with findings from Sudore et al. and other studies that controlled for confounders.

Communication Strategies to Address Low Health Literacy

The findings of this study collectively point to an urgent need for healthcare providers to adopt health literacy-sensitive communication practices. Evidence-based strategies include:

- Teach-Back Method: Clinicians ask patients to restate instructions in their own words, allowing immediate identification and correction of misconceptions.
- Plain Language: Replacing medical jargon with simple, active-voice sentences limited to 6th-grade reading level.
- Pictorial Instructions: Visual depictions of medication dosing schedules, warning signs, and procedure preparation steps.
- Multilingual Materials: Patient education materials in regional languages including Marathi, Hindi, and other local languages.
- Simplified Consent Forms: Shorter, plain-language consent documents supplemented with verbal explanation and teach-back confirmation.
- Health Navigator Programs: Trained community health workers or patient navigators who assist low-literacy patients in understanding and acting on health information.

5. Conclusion

Low health literacy is highly prevalent and significantly affects comprehension of medical information among patients attending tertiary healthcare facilities.

Patients with inadequate health literacy demonstrate poor understanding of prescription instructions, consent forms, and follow-up advice, which may adversely affect treatment outcomes.

Healthcare professionals should adopt simplified communication strategies and develop literacy-sensitive educational interventions to improve patient understanding and healthcare outcomes.

Further multicentric studies are recommended to evaluate effective interventions aimed at improving health literacy in diverse populations.

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