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ORIGINAL RESEARCH

Functional Health Literacy in Patients with Cardiovascular Diseases: Cross-Sectional Study in Ethiopia

Desalew Tilahun[1]
Adanech Gezahegn[2]
Kenenisa Tegenu[1]
Belete Fenta[3]

[1]Nursing School, Faculty of Health Science, Institute of Health, Jimma University, Addis Ababa, Ethiopia; [2]Health Information, Jimma Medical Center, Addis Ababa, Ethiopia; [3]Midwifery School, Faculty of Health Science, Institute of Health, Jimma University, Addis Ababa, Ethiopia

Objective: This study assessed functional health literacy and associated factors among adult patients with cardiovascular diseases (CVDs) in Ethiopia.

Methods: A cross-sectional study was conducted on 410 respondents from May 1 to July 1, 2020, using a functional health literacy questionnaire consisting of 14 items that covers three conceptually distinct functional health literacy domains: having sufficient information to manage my health, ability to find good health information and understand health information well enough to know what to do. Data were analyzed using the Statistical Package for Social Sciences (SPSS) Version 23. Data were collected by exit face-to-face interview using an interviewer administered and pre-tested questionnaire. Statistical significance of associated variables had been declared based on the adjusted odds ratio (AOR) with its 95% CI and p-value <0.05.

Results: Adequate functional health literacy was determined in 55.4% of CVD patients understanding health information whereas inadequate functional health literacy was determined in 53.9% participants for finding health information and in 50.5% of them having sufficient information to manage my health. Educational status was found to have a statistically significant association across the three domains.

Conclusion: The functional health literacy level of CVD patients varied by domain. Educational status of the participant is significantly associated with the three domains of functional health literacy whereas household monthly income and number of information sources are significantly associated with having sufficient information and the ability to find good health information. The findings indicate the need to streamline medical communication that improves the functional health literacy of CVD patients.

Keywords: health literacy, cardiovascular diseases, adults, Ethiopia

Introduction

Cardiovascular diseases (CVDs) result in millions of deaths around the world annually, most of which are avoidable if identified early.[1] In Ethiopia, non-communicable diseases (NCDs) cause 42% of deaths, of which 27% are premature deaths, that is, before 70 years of age.[2] Of these, CVD accounts for 24% of deaths.[3] Preventive healthcare takes a prominent role in the fight against CVD.[1] Health literacy (HL) is an effective means of preventing primary and secondary CVD,[4] through generating and understanding effective prevention mechanisms for the management of CVD as a lifelong process.[5] It does so by addressing cardiac rehabilitation components such as patient assessment, education and self-management strategies to

Correspondence: Desalew Tilahun
Email desalewtilahun34@gmail.com

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promote behaviour change, exercise, psychosocial support and medical follow-up.[6] Furthermore, HL plays a crucial role in prevention, adherence to treatment, self-care, and better use of health care.[7]

Health literacy represents cognitive and social skills that involve understanding access to and use of information in the way it promotes and maintains good health.[8] On the other hand, HL also refers to the use of health information to follow medical instructions and communication with healthcare providers on the journey of receiving healthcare services.[9–12] Functional health literacy (FHL) is one component of HL denoting sufficient basic reading and writing skills to function effectively in everyday circumstances.[13] FHL encompasses three of the nine HL domains identified in *Health Literacy (HLQ): Understanding health information, having sufficient information and finding useful health information*.[9]

The functional health literacy level (FHLL) of patients with CVD is linked with patients' knowledge about their diseases, which can further affect patients' health status, disease complications and[14] disease outcomes.[14,15] For example, CVD patients with inadequate FHLL experience a higher frequency of hospitalization,[16] an increased risk of mortality,[17,18] lower receipt of preventive services, a poorer ability to interpret labels and health messages, a higher rate of medication errors have poorer overall health status.[19] They are also challenging to counsel, less likely to comprehend the benefits and risks of medication adherence,[20] have little capacity for self-care, are unlikely to modify risky lifestyles, more frequently develop CNCD complications[21] and have diminished self-management and decision-making skills.[22] Lower FHL in CVD patients is associated with impaired comprehension of the disease and medical instructions and an inability to question healthcare professionals.[23]

Overall, HL is the sum of many factors, including where the person lives. For example, a study conducted in Slovakia with medical students revealed high FHLL relating to finding useful health information (70%) and understanding health information (75.6%).[24] In contrast, a study in Nepal found high FHLL on functional health literacy domains such as having sufficient information (23.5%), finding useful health information (24.8%) and understanding health information (25.2%).[25]

Several studies[7,26–30] have suggested that differences of FHLL across the globe in relation to health literacy domains are associated with socio-demographic and socio-economic characteristics (including age, sex, residence, marital status, education status, occupational status and income) and disease-related factors. However, there is a paucity of information about functional health literacy and associated factors among patients with CVD in Ethiopia. Thus, this study aimed to identify personal and socio-demographic factors associated with functional health literacy in CVD patients in Ethiopia.

Materials and Methods

Study Design and Setting

A cross-sectional study was conducted from May 1 to July 1, 2020, at a chronic illness clinic follow-up in JMC, Ethiopia. JMC is one of the oldest public hospitals that provides inpatient, outpatient, emergency, and chronic clinic follow-up services for an estimated 15 million people in soutwest Ethiopia. Per year, a total of 16,000 patients with chronic non-communicable diseases receive follow-up at the medical center, among which 1200 were identified as having CVD during data collection.

Study Population

The study included all adult patients aged 18 years and above receiving follow-up care at JMC for CVD and excluded those patients who had a hearing impairment or were seriously ill and required urgent care at the time of data collection. A total of 422 study participants were identified using a single population proportional sample size calculation formula based on a 50% health literacy estimate since there is no prevalence data in the context of Ethiopia. We used a 95% confidence interval; $Z\alpha_{/2}$ =1.96, margin of error=0.05 and non-response rate = 1

Ahead of the actual data collection, details of patients who attended the clinic over the period of two months were obtained from the patient registration logbook. In two months, there were 1200 patients with CVD. We used a simple random sampling technique to select individual study participants whereby each patient's card was given a unique code and then patients' cards were randomly selected online using https://www.calculatorsoup.com/calculators/statistics/random-number-generator.php.

Data Collection Procedure, Method and Instrument

We confirm that the institutional review board (IRB) of Jimma University approved both the study and the consent process. Then the letter of permission was given to Jimma University medical center administrative body and this

study was conducted in accordance with the Declaration of Helsinki. Written informed consent was obtained from literate patients and oral consent from illiterate patients. Data collectors explained the objectives and their right to refuse and discontinue the data collection process.

The functional health literacy (FHL) measurement tool was adopted from the comprehensive Health Literacy Questionnaire (HLQ), which was initially developed using a grounded, validity-driven approach[9] and has been validated. Bayesian confirmatory factor analysis has deep-rooted high composite reliability in all nine HLQ scales (Cronbach's alpha ≥0.8).[31] The HLQ has been validated and translated into many languages and used to examine health literacy across many different populations, cultures and settings,[11,32–38] including Australia.[35,39–43] The FHL scale consists of 14 items that cover three conceptually distinct domains of health literacy representing scale 2.8 and 9 in HLQ: HLQ2 – having sufficient information (4 items), HLQ8 –finding health information (5 items) and HLQ9 – understanding health information (5 items).[9] For HLQ1, four-point ordinal response options were used, and participants were asked to rate their level of agreement on HLQ statements as 1 = strongly disagree, 2 = disagree, 3 = agree and 4 = strongly agree; for HLQ2 and HLQ3, the five-point ordinal responses were: 1 = cannot do, 2 = very difficult, 3 = quite difficult, 4 = quite easy and 5 = very easy.[44]

The scoring algorithm of HLQ produces independent scores for each of the three domains of the FHL. The scorings for each domain were calculated by adding each item's score for a domain, then multiplying it by the total number of items in the domain and, finally, dividing it by the maximum possible score of that domain. Thus, HLQ does not yield one overall summative score.[9] High scores for each domain reflect high HLL within the domain and vice versa. The logic behind the use of HLQ is that it measures conceptually distinct scores in each domain that indicate a person's strengths and weaknesses in relation to their health literacy.[9]

Data were also collected on patients' socio-demographic and socio-economic characteristics (age, residence, monthly household income, sex and marital, occupational and educational status), disease-related factors (complications and co-morbidity). The instrument was translated to Afaan Oromo and Amharic versions by experts who were fluent in both languages and translated back to English to check its consistency. Then Afaan Oromo and Amharic versions of the HLQ were used for data collection. Data was collected using a pretested translated version of the instrument through face-to-face interviews at a chronic illness clinic by two trained and experienced BSC nurses. It took 15–20 minutes to complete. The hospital COVID-19 prevention strategies were used, including using masks and hand sanitizers and maintaining a minimum 1.5-meter distance between interviewers and interviewees in an open room.

Data Quality Handing, Process and Analysis

Data quality was ensured during data collection, coding, double-data entry and analysis. One day's training was given to a supervisor and data collectors on data collection tools and procedures to prevent any confusion and ensure a common understanding of the study. A pre-test was done with 5%[21] of the sample participants prior to actual data collection to assess the clarity and reliability of the data collection tool. Data from the pre-test was not included in the actual data. The scale reliability was assessed using the internal consistency of the reliability test. By far, all constructs of FHL reported excellent reliability, with an overall alpha value of 0.95 and more than 0.8 for each domain. Close supervision of the data collection process was carried out, and the completeness and consistency of questionnaires were checked on a daily basis. The data entry and cleaning processes were also closely monitored.

Data was coded, processed, entered into Epidata V3.1 and then exported to SPSS V23 for analysis. Before the actual data analysis, data was explored for completeness, outliers and missing values and then cleaned. We found no missing data. Next, descriptive (frequency, percentage) measures of central tendency (means) and dispersion (standard deviation, range) were computed. Multicollinearity was checked before the data analysis, and collinearity statistics showed that independent variables were uncorrelated given that variance of inflation factor (VIF) <10 and tolerance test is less than one for all independent variables. All independent variables with a p-value of 0.25 (to include important variables in multivariate analysis) after running for bivariate logistic regression were candidates for multivariate analysis using backward LR logistic regression. In the final model, variables with a p-value of less than 0.05 were regarded as significantly associated with functional health literacy domains.

Inter-quartile ranges were calculated for all included FHL domains separately, where the upper quartile cut-offs were used to define "high FHLL" and the lower two quartiles as "low health literacy level". This applied to categorization of all three FHL domains as there was no standard cut-off.[25]

Results

Patient Characteristics

Out of 422 participants, 410 gave their responses, giving a response rate of 97.2%. The age of study participants ranged from 18–88, with a mean age of 48 years (SD = 14.9). More than half, 211 (51.7%), of study participants were male. Over half, 219 (53.9%), were rural residents. Just under three-quarters, 301 (73.8%), were married. The majority (83.6%) of study participants had one co-morbidity and close to three-quarters (73.3%) had complications from CVD (Table 1).

Table 1 Sample Characteristics

Variables	Category	Frequency (n = 408)	Percentage (%)
Age	18–33	79	19.3
	34–49	118	28.8
	50–65	156	38.0
	> 65 years	57	13.9
Sex	Male	212	51.7
	Female	198	48.3
Marital status	Single	58	14.1
	Married	302	73.7
	Divorced	24	5.9
	Widowed	26	6.3
Educational status	Illiterate	153	37.3
	Grades 1–8	124	30.2
	Grades 9–12	76	18.5
	College and above	57	13.9
Occupational status	Unemployed	9	2.2
	House wife	110	26.8
	Government employee	101	24.6
	Own business	45	11.0
	Private employee	28	6.8
	Farmer	117	28.5
Monthly household income (1 USD = 40.42 ETB)	<12.37 USD	85	20.7
	12.37–24.74 USD	73	17.8
	>24.74 USD	252	61.5
Residence	Rural	221	53.9
	Urban	189	46.1
Presence of co-morbidity	One	343	83.7
	Two or more	67	16.3
Complication/s from CVD (stroke, angina, pulmonary edema)	Yes	301	73.4
	No	109	26.6

Functional Health Literacy Level (FHLL)

Table 2 illustrates the functional health literacy level of study participants. Patients with CVD had low FHLL except for in the understanding health information domain; here, more than half of the participants had high FHL. Mostly low FHL was the case for the finding health information domain.

Factors Associated with FHL Domains

Table 3 summarizes factors associated with FHL domains. Those study subjects with a monthly income of more than 1000 birr are 2.93 times more likely to get sufficient health information, as are participants with an educational level of college and above (2.92 times more likely). Female patients with CVD are 35% less likely to have sufficient health information than their male counterparts. In relation to finding useful healthcare information, participants who attended college and above are 8 times, those who completed grades 9–12 are almost 3.3 times, those who completed grades 1–8 are 2.6 times, study subjects with a household monthly income of more than 1000 birr are 2 times and those with 500–1000 birr are 1.6 times more likely to do so. In contrast, study subjects who had complications from the disease are 15% less likely to find useful health information.

Those study participants with CVD who attended college and above are 4.5 times, those who completed grades - 9–12 are 3.8 times, those with a monthly household income higher than 1000 birr are 3.3 times, those who completed grades 1–8 are 3 times and those with a household monthly income of 500–1000 birr are 2.9 times more likely to understanding health information.

Discussion

To the best of our knowledge, this is the first study of its kind in the context of Ethiopia. The overall findings show

Table 2 Functional Health Literacy Level

FHL Domain	Mean (±SD)	FHLL	
		High FHLL	Low FHLL
Having sufficient information	2.55 (0.86)	203 (49.5%)	207 (50.5%)
Finding health information	2.73 (1.17)	189 (46.1%)	221 (53.9%)
Understanding health information	3.3 (1.2)	227 (55.4%)	183 (44.6%)

that just under half of patients with CVD had low FHLL for understanding health information, more than one out of two patients for finding health information and one out of two for having sufficient information. Though it varies from domain to domain, the low FHLL in domains indicates that the majority of patients with CVD on follow-up at Jimma Medical Center, Ethiopia, ack the cognitive and social skills that promote and maintain good health,[8] are unable to follow necessary medical instructions[29] or have inadequate communication with healthcare providers on the journey of receiving healthcare services.[9–12]

The findings of the current study on FHL domains reveal that the participants were less able to find useful health information and understand health information than the Slovakian medical students questioned in a previous study.[24] This discrepancy could be due to variations in the study population and socio-demographic characteristics. For example, the study carried out in Slovakia involved medical students who can search for, read and understand health-related information, so that they can stay up to date, which in turn is positively linked with high FHLL and, ultimately, improved overall health status. In contrast, in this study more than one-third of respondents were in the age range 50–65 years and had not received formal education. Cognitive abilities decline with age, making reading about and comprehending one's disease more difficult and resulting in less attention being paid to prevention.

However, the results found in this study were higher than those identified in Nepal in relation to the FHL domains of: having sufficient information, finding useful health information and understanding health information.[25] This could be due to variations in socio-demographic characteristics and the number of chronic diseases experienced by study participants. For example, of the study participants in Nepal, close to three-quarters had two or more co-morbidities, which challenges them to self-manage as most guidelines are available for a single disease. This indicates that having two or more chronic diseases is likely to make managing daily treatment regimens more difficult. Dealing with complex disease management can lead to low FHL and eventually poor health outcomes. It may also be challenging to navigate the health care system and comprehend and appraise information relating to two diseases at the same time. In addition, 70 out of 100 study respondents were also uneducated, which means they were unable to read and comprehend medical information provided by healthcare providers, which in turn led to their having less knowledge about their disease, then to paying less attention to prevention and, ultimately, low FHLL.

There are several factors affecting individual FHL.[7,26–30] In our study and others, educational status was shown to be significant because educated people are more likely to have sufficient information to manage their health and better judge health-related information.[26] Educated individuals may be aware about their diseases so they may participate in preventive services for early diagnosis, which in turn prevents disease complications and comorbidities, which enables them to prevent disease burden. Moreover, educated individuals possess knowledge about their disease,[7] are proactive and confident enough to communicate with healthcare providers and gain information about their health,[27] can make sound decisions when navigating the healthcare system and their improved HL ultimately improves their treatment outcomes.[26] On top of this, being educated enables people to get better jobs, earn a good income and hence gain timely access to health services, which in turn may lead to the better health actions required for managing chronic health conditions.

In this study, monthly household income was significantly associated with three FHL domains: having sufficient information, finding useful health information and understanding health information. This association indicates that patients with high socio-economic status can access timely healthcare services as they can afford them. This finding is also supported by studies in Mashhad, Iran, Myanmar and Catalan,[29,30,45] indicating that those patients with high socio-economic status can afford to get high-quality healthcare services.

In relation to finding health information, of those respondents who had complications from their disease,

Table 3 Multivariate Logistic Regression Analysis of Factors Associated with FHL Domains

Functional Health Literacy Domains							
		HIS		**FHI**		**UHI**	
Variables	**Category**	**AOR (95% CI)**	**p-value**	**AOR (95% CI)**	**p-value**	**AOR (95% CI)**	**p-value**
Age	18–33	1		1		1	
	34–49	0.99 (0.49–2)	0.307	0.94 (0.44–2)	0.316	1.32 (0.47–3.7)	0.2007
	50–65	1 (0.5–2.02)	0.463	0.85 (0.4–1.83)	0.417	1.35 (0.48–3.76)	0. 408
	>65	0.7 (0.29–1.67)	0.928	0.73 (0.28–1.9)	0.988	1.89 (0.55–6.51)	0. 206
Sex	Male	1		1		1	
	Female	0.65 (0.43–0.98)	**0.006****	0.83 (0.45–1.53)	0.483	1.11 (0.49–2.52)	0.712
Educational status	Illiterate	1		1		1	
	Grades 1–8	2.1 (1.27–3.46)	**0.002****	2.6 (1.52–4.49)	**0.002****	3 (1.7–5.1)	**0.002****
	Grades 9–12	2.81 (1.42–5.54)	**0.008****	3.26 (1.72–6.17)	**0.003****	3.8 (1.7–4.1)	**0.004****
	College and above	2.92 (1.62–5.27)	**0.007****	8 (6.65–24)	**0.000****	4.5 (2.6–6.4)	**0.000****
Residence	Rural	1		1		1	
	Urban	1.22 (0.73–2.02)	0.886	0.88 (0.51–1.52)	0.269	1.01 (0.48–2.1)	0.869
Household monthly income (1 USD = 40.42 ETB)	<12.37 USD	1		1		1	
	12.37–24.74 USD	1.49 (1.25–3.96)	**0.003****	1.57 (0127–3.24)	**0.041***	2.9 (1.4–5.4)**	**0.008**
	>24.74 USD	2.93 (1.53–3.62)	**0.004****	1.98 (1.12–3.51)	**0.012***	3.3 (1.38–7.8)*	**0.017**
Presence of co-morbidity	One	1		1		1	
	Two or more	1.15 (0.65–2.05)	0.342	0.69 (0.37–1.3)	0.104	1.23 (0.54–2.82)	0.218
Complications from CVD (stroke, angina, pulmonary edema)	No	1		1		1	
	Yes	0.83 (0.52–1.34)	0.231	0.85 (0.11–0.97)	**0.045***	1.22 (0.61–2.44)	0.653

Notes: *Statistically significant association at p-value <0.01; **statistically significant association at p-value <0.05; bolded p-value indicates statistically significant association; 1 – reference category.

Abbreviations: HIS, having sufficient information; FHI, finding health information; UHI, understanding health information; AOR, adjusted odds ratio; CI, confidence interval; USD, United States dollar; ETB, Ethiopian birr.

15% were less likely to have high FHLL than those who had no complications. This indicates that a significant number of patients with CVD are at risk of developing poor health outcomes. This contrasts with the findings of another study,[24] in which participants without chronic diseases had a low health literacy level. Summarizing the discussion, using three FHL domains of the HLQ as a tool to measure the health literacy of patients with CVD was found to be feasible and practicable. Each individual scale provided a detailed and action-oriented picture of health literacy competencies and limitations among patients with CVD.

This study has many strengths and limitations. All CVD patients receiving follow-up at the hospital had an equal chance of being included in the study. The study highlights areas of strength and weakness of patients with CVD, which is a good insight and highly relevant for organizations or practitioners seeking to intervene. The major limitations of this study are that the tool was utilized only in Ethiopia, which questions its external validity; clinical data and socio-demographic and economic status were self-reported by patients, which imposes a bias; and because it uses a cross-sectional design, the relationships identified should be interpreted as associations rather than cause and effect.

In conclusion, the study identifies that the level of functional health literacy in patients with CVD varies by domain. The current study highlights that high FHLL was seen in one of three and low FHLL in two of three FHL domains. Educational status and household monthly income were found to be significantly associated with three of the FHL domains. Complications from CVD was an independent factor in relation to finding good health information.

The findings indicate the need to design a strategy that improves the functional health literacy in CVD patients. For example, in addition to routine care, healthcare providers, especially nurses and doctors, should encourage patients to understand health information FHL domains and give due attention to providing up-to-date, reliable and applicable health information for two of three FHL domains to enhance HLL. They should also use the teach-back method and empower patients to have high FHLL so that patients can manage their CVD over their lifetime.

Abbreviations

CNCD, Chronic non-communicable diseases; SPSS, Statistical Package for Social Sciences; COR, Crude odds ratios; AOR, Adjusted odds ratio; HL, Health literacy; FHLL, Functional health literacy level; JMC, Jimma Medical Center; CVD, Cardiovascular diseases; HLQ, Health literacy questionnaire; VIF, Variance of inflation factor; LR, Likelihood ratio; SD, Standard deviation.

Data Sharing Statement

Due to no consent from the study participants to disclose raw data, this data could not be made available in order to protect the participants' identity.

Consent for Publication

Not applicable.

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Author Contributions

All authors (DT, AG, KT and BF) made substantial contributions to conception and design, acquisition of data, or analysis and interpretation of data; took part in drafting the article or revising it critically for important intellectual content; agreed to submit to the current journal; gave final approval of the version to be published; and agree to be accountable for all aspects of the work.

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Disclosure

The authors reported no conflicts of interest for this work.

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