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Original Article

Health literacy levels of adolescents and their parents visiting a pediatric outpatient clinic

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ABSTRACT

Objective: This study aimed to assess the health literacy (HL) levels of adolescents and their parents attending the pediatric outpatient clinic of a training and research hospital and to evaluate the hypothesis that HL correlates with serum 25-hydroxyvitamin D3 levels, serum vitamin B12 (cobalamin) levels and sociodemographic characteristics.

Material and Methods: This descriptive cross-sectional study included 302 adolescents aged 14 years and older, along with their parents, who attended the general pediatrics outpatient clinic of Haydarpaşa Numune Training and Research Hospital from November to December 2022. Data were collected using a sociodemographic information form, serum 25-hydroxyvitamin D3 levels, serum vitamin B12 levels of adolescents according to hospital records, the Hacettepe University Health Literacy Scale-Long Form (HU-HL) for parents, and the Adolescent e-Health Literacy Scale (eHEALS) for adolescents. Non-parametric statistical tests were used due to the non-normal distribution of the data.

Results: The mean age of adolescents was 15.47±1.09 years, with 56% identified as female. The mean age of the parents was 44.49±5.02 years, with 84.8% being mothers. Among parents, 21.2% exhibited low HL levels, 57.3% shown moderate levels, and 21.5% displayed high levels. The average total score of eHEALS was 27.78±5.40. Female parents exhibited markedly superior HL scores compared to male parents (p=0.003). Serum 25-hydroxyvitamin D3 (25(OH)D3) levels, serum vitamin B12 (cobalamin) levels, as well as body mass index (BMI), exhibited no significant correlation with HL scores. Nonetheless, parents of female adolescents had markedly higher HL scores compared to those of male adolescents (p=0.013).

Conclusion: Parents of female adolescents demonstrated significantly higher HL levels than those of male adolescents. These findings underscore the need for targeted interventions to address HL disparities among caregivers and adolescents. Future research should explore longitudinal and causal relationships between HL and biological as well as sociodemographic determinants.

Keywords: Adolescent, health literacy, parents

INTRODUCTION

The concept of health literacy (HL) was first proposed by Simonds in Health Education as Social Policy, which emphasized the importance of HL on national health and the provision of the most basic HL education for students in schools (1). Baker proposed that HL is an important predictor of health status and outcomes (2). Health literacy denotes an individual's ability to access, comprehend, assess, and utilize health-related information and services to sustain optimal health and well-being (3). Health literacy is a complex concept with implications at the individual, family, societal, and systemic levels. The framework encompasses cognitive and functional skills, including reading, comprehending, and analyzing information; interpreting symbols, instructions, and graphical data; assessing health risks and benefits; and making informed decisions (4). Health literacy is an important issue in public health today, especially as patients are taking a greater role in obtaining information about their health. In a study examining the HL level of parents in the management of type 1 diabetes in children and adolescents, it was reported that one in every two parents had problematic, limited and inadequate HL

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levels (5). Parental HL is the best-known household facilitator of adolescent HL (6). A comprehensive review of HL among adolescents and young adults in the Eastern Mediterranean region found low-to-moderate levels of HL among adolescents and young adults in the Eastern Mediterranean region (7).

Health literacy is an important factor in disease prevention and control (8). A study assessing the correlation between HL and blood parameters in hypertensive patients revealed that those with high literacy exhibited lower total cholesterol and HDL-C levels compared to those with poor literacy (9). A study investigating HL in hypertensive patients with renal illness was found to correspond with specific blood indicators, including fasting blood glucose and estimated glomerular filtration rate (10). A study investigating the significance of metabolic, hematological, and functional health, along with parental HL in adults with Down syndrome, indicated that the overall health literacy score correlated with hemoglobin and hematocrit levels (11).

Notwithstanding the acknowledged significance of HL, data regarding the concurrent assessment of adolescent and parental HL in Türkiye are limited. This study aimed to assess the HL levels of adolescents and their parents at a pediatric outpatient clinic in a training and research hospital, and to evaluate the hypothesis that HL levels correlate with serum 25-hydroxyvitamin D3 (25(OH)D3) levels, serum vitamin B12 (cobalamin) levels and sociodemographic characteristics.

MATERIALS and METHODS

This cross-sectional study design was used. The study population comprised 302 adolescents aged 14 years and older, accompanied by one parent, who attended the general pediatrics outpatient clinic of Haydarpaşa Numune Training and Research Hospital between November and December 2022. Only literate individuals who gave their voluntary consent were included in the study. Those who were illiterate or failed to provide informed consent were excluded from the study.

Data Collection Tools

Data was collected using three instruments: a sociodemographic information form, the Hacettepe University Health Literacy Scale-Long Form (HU-HL) for parents, and the Adolescent e-Health Literacy Scale (eHEALS) for adolescents. The questionnaires were self-administered by participants under supervision to guarantee precision and accuracy. The researchers measured anthropometric data (height and weight) in the outpatient clinic, while serum 25-hydroxyvitamin D3 (25(OH)D3) levels, serum vitamin B12 (cobalamin) levels were retrieved from hospital records.

The sociodemographic information form comprised items evaluating participants' age, gender, educational attainment, income-expenditure ratio, and smoking status. Furthermore, the height and weight of adolescents were assessed to compute body mass index (BMI), and serum 25-hydroxyvitamin D3 (25(OH)D3) levels, serum vitamin B12 (cobalamin) levels were retrieved from hospital records. BMI categories were determined based on WHO 2007 growth reference for children and adolescents aged 5–19 years, using BMI-for-age percentiles: underweight (<5th percentile), normal (5th–85th), overweight (85th–95th), and obese (≥95th percentile). Serum 25(OH)D3 levels were categorized as follows: deficiency (<20 ng/mL), inadequacy (20–29 ng/mL), and normal (≥30 ng/mL), based on the Endocrine Society guidelines (12,13).

The Hacettepe University Health Literacy Scale, validated and reliable, was established by Özvarış et al. (14) and comprises 38 questions totaling 71 items, along with an additional self-efficacy section with 16 items. Items are evaluated with a score of 0 or 1, contingent upon accuracy. The overall score varies from 0 to 71, with elevated levels signifying superior health literacy. This study reported Cronbach's alpha values of 0.82 for the subdimension "Health Protection and Promotion," 0.91 for "Access to Treatment and Health Services," and 0.92 for the total scale. The self-efficacy part, evaluated independently had a Cronbach's alpha of 0.84. Health literacy levels were classified as follows: 0–32 (inadequate), 33–52 (moderate), and 53–71 (adequate) (14).

The Adolescent e-Health Literacy Scale, first developed by Norman and Skinner and then modified into Turkish by Coşkun and Bebiş, comprises 10 items. Two items were assessing internet usage and eight were assessing perceived e-health literacy. Responses are evaluated on a 5-point Likert scale (1=strongly disagree to 5=strongly agree), yielding total scores between 8 and 40. Elevated scores indicate enhanced e-health literacy (15). The Cronbach's alpha was 0.78 in the original study and 0.817 in the current sample.

This study did not involve pilot testing for item clarity or cultural adaptation within the sample. Participants were notified prior to the commencement of data collection, and written informed consent was obtained from the volunteers on behalf of themselves and the adolescents.

Statistical Analysis

Data analysis was conducted using IBM SPSS Statistics, version 22.0 (IBM Corp., Armonk, NY, USA) for the Windows operating system. The mean and standard deviation (SD) were calculated for the quantitative data. The data distribution was presented using numerical tables (n) and percentages (%). The distribution normality for each parameter was assessed using the Kolmogorov-Smirnov test. The data acquired from this investigation exhibited a non-normal distribution. The Mann–Whitney U test and the Kruskal–Wallis test were employed to compare the medians of two separate groups and multiple independent groups, respectively. Upon detecting significant differences in the Kruskal–Wallis analysis, pairwise comparisons were performed utilizing the Mann–Whitney U test to ascertain

the source of the discrepancy. The statistical significance was accepted as p<0.050.

RESULTS

A total of 302 adolescents participated in the study. The mean age was 15.47±1.09 (13-18 years), with 56.0% being female. A significant majority (96.4%) remained enrolled in high school. While 18.2% stated that they smoked at least once, the remaining 81.8% had never smoked. The average height and weight were 166.99±8.58 cm and 62.14±13.92 kg, respectively, yielding a mean BMI of 22.18±4.08. The mean values of serum 25-hydroxyvitamin D3 (25(OH)D3) levels, serum vitamin B12 (cobalamin) levels were 17.60±8.78 ng/mL and 304.10±119.98 pg/mL, respectively. Of the 302 participating parents, 84.8% were female, with an average age of 44.49±5.02 (32-65 years). In terms of educational achievement, 33.1% completed primary school or lower, 25.8% completed secondary school, 31.1% completed high school, and 9.9% obtained a university degree. Regarding income status, 58.9% indicated that their income matched their expenses. A majority of parents (69.9%) classified themselves as housewives. Furthermore, 27.5% of subjects reported smoking daily. The average number of children per parent was 2.59 ±0.97 (Table I).

Table I: Descriptive characteristics of the study participants

Adolescents	
Age*	15.47±1.09 (13-18)
Height† (cm)	166.99±8.58
Weight† (kg)	62.14±13.92
BMI† (kg/m²)	22.18±4.08
25(OH)D3 levels† (ng/mL)	17.60±8.78
Serum vitamin B12 (cobalamin) levels† (pg/mL)	304.10±119.98
Gender‡	
Male	133 (44.0)
Female	169 (56.0)
School attendance‡	
No formal education	9 (3.0)
Secondary school	2 (0.7)
High school	291 (96.4)
Smoking status, ever smoked‡	
No	247 (81.8)
Yes	55 (18.2)
Parents	
Age*	44.49±5.02 (32-65)
Number of children†	2.59±0.97
Gender‡	
Male	46 (15.2)
Female	256 (84.8)
Education level‡	
Primary school or below	100 (33.1)
Secondary school	78 (25.8)
High school	94 (31.1)
University degree	30 (9.9)
Parents smoking‡	
Never	169 (56.0)
Less than daily	50 (16.6)
Daily	83 (27.5)
Employment status‡	
Housewife	211 (69.9)
Worker	20 (6.6)
Tradesmen	14 (4.6)
Self-employed	14 (4.6)
Other	43 (14.2)
Economical situation‡	
Income less than expenditure	99 (32.8)
Income equal to expenditure	178 (58.9)
Income more than expenditure	25 (8.3)

***:** *mean±SD (min–max),* **†:** *mean±SD,* **‡:** *n(%),* ***BMI:** Body Mass Index, **25(OH)D3:** Serum 25-hydroxyvitamin D*

Table II: Education level of parents

Education level	male*	female*
Primary school or below	12 (26.1)	88 (34.4)
Secondary school	3 (6.5)	75 (29.3)
High school	25 (54.3)	69 (27.0)
University degree	6 (13.0)	24 (9.4)

***:** *n(%)*

Table III: Health literacy levels of the study participants

Measure	mean±SD
Adolescent e-Health Literacy Total Score	27.78±5.40
HU-HL Health Protection and Promotion Subdimension	11.50±3.59
HU-HL Access to Treatment and Health Services Subdimension	30.55±9.04
HU-HL Total Score	42.04±11.85
HU-HL Self-Efficacy Scale Total Score	39.57±5.26

***HU-HL:** Hacettepe University Health Literacy*

In our study, 21.2%, 57.3%, and 21.5% of the parents exhibited inadequate, moderate and adequate levels of health literacy, respectively.

Of the mothers surveyed, 34.4% completed primary school or less, 29.3% attained secondary school education, 27.0% finished high school, and 9.4% obtained university degrees (Table II).

The average overall score for eHEALS was 27.78±5.40. The average score for the Health Protection and Promotion subdimension of the HU-HL scale was 11.50±3.59, but the Access to Treatment and Health Services subdimension recorded a mean of 30.55±9.05. The cumulative HU-HL score was 42.05±11.85. The average total score of the Self-Efficacy Scale was 39.57±5.26 (Table III).

In the comparison of scale scores according to adolescent characteristics, female participants exhibited significantly higher scores than their male counterparts in the HU-HL Health Protection and Promotion subdimension (p=0.016), the Access

Table IV: Comparison of adolescents' descriptive characteristics based on HU-HL Scale Scores

Characteristic	Adolescent e-Health Literacy Total Score*	p	HU-HL: Health Protection & Promotion*	p	HU-HL: Access to Treatment & Services*	p	HU-HL Total Score*	p
Gender								
Male	29 (12-40)	0.167†	10 (3-20)	0.016†	28 (6-48)	0.026†	39 (12-67)	0.013†
Female	28 (14-40)		12 (3-20)		33 (5-47)		44 (9-65)	
School Attendance								
No formal education	30 (25-39)	0.345‡	11 (3-17)	0.056‡	22 (14-46)	0.235‡	36 (17-63)	0.132‡
Secondary school	29 (26-32)		5.5 (5-6)		21 (16-26)		26.5 (22-31)	
High school	28 (12-40)		11 (3-20)		31 (5-48)		42 (9-67)	
Ever smoked tobacco								
No	28 (12-40)	0.691†	11 (3-20)	0.675†	30 (5-48)	0.311†	41 (9-67)	0.404†
Yes	28 (14-40)		11 (4-20)		31 (7-47)		43 (16-67)	
BMI Category								
Underweight	29 (16-37)	0.632‡	10 (5-19)	0.074‡	28 (7-48)	0.173‡	39 (16-67)	0.083‡
Normal weight	28 (12-40)		11 (3-20)		31 (6-48)		41 (12-65)	
Overweight	30 (19-37)		12 (3-18)		33 (5-47)		45 (9-65)	
Obese	28 (12-40)		12.5 (8-20)		35.5 (7-47)		49 (16-67)	
(25(OH)D3) levels								
Deficiency	29 (14-40)	0.473‡	11 (3-20)	0.083‡	31 (5-48)	0.922‡	42 (9-67)	0.649‡
Inadequacy	28 (14-38)		12 (5-19)		31 (13-48)		41 (21-65)	
Normal	28 (12-40)		12 (6-19)		28 (8-46)		40 (18-64)	

***:** *median (min–max),* **†:** *Mann–Whitney U test,* **‡:** Kruskal Wallis test, ***BMI:** Body Mass Index, **HU-HL:** Hacettepe University Health Literacy, **25(OH)D3:** Serum 25-hydroxyvitamin D*

Table V: Comparison of parental characteristics based on HU-HL Scale Scores

Measure	Fathers of Adolescents*	Mothers of Adolescents*	p†
Adolescent E-Health Literacy Total Score	28 (20-38)	28 (12-40)	0.718
HU-HL Health Protection and Promotion Subdimension	9 (4-19)	11 (3-20)	0.005
HU-HL Access to Treatment and Health Services Subdimension	28 (7-46)	32 (5-48)	0.005
HU-HL Total Score	36.5 (16-64)	43 (9-67)	0.003

:** *median (min–max),†:** *Mann Whitney U test,* ***HU-HL:** Hacettepe University Health Literacy Scale*

to Treatment and Health Services subdimension (p=0.026), and the overall HU-HL score (p=0.013). No statistically significant differences were detected in the total score of eHEALS, BMI categories, smoking history, educational attainment or serum 25-hydroxyvitamin D3 (25(OH)D3) levels (Table IV).

In the comparison of parental HL scores, mothers exhibited significantly superior scores compared to fathers in the HU-HL Health Protection and Promotion subdimension (p=0.005), the Access to Treatment and Health Services subdimension (p=0.005), and the overall HU-HL total score (p=0.003). No statistically significant variation was detected in the total score of eHEALS according to parental gender (Table V).

DISCUSSION

This study aimed to assess the HL levels of adolescents and their parents attending the pediatric outpatient clinic of a training and research hospital and to evaluate the hypothesis that HL correlates with serum 25-hydroxyvitamin D3 (25(OH) D3) levels, serum vitamin B12 (cobalamin) levels and sociodemographic characteristics. In our study, it was seen that one in every five parents was in the inadequate health literacy category. In the comparison of scale scores according to adolescent characteristics, female participants exhibited significantly higher scores than their male counterparts in the HU-HL Health Protection and Promotion subdimension, the Access to Treatment and Health Services subdimension, and the overall HU-HL score. In the comparison of parental health literacy scores, mothers exhibited significantly superior scores compared to fathers in the HU-HL Health Protection and Promotion subdimension, the Access to Treatment and Health Services subdimension, and the overall HU-HL total score.

Our study revealed a mean total eHEALS score of 27.78±5.40, indicating a moderate level among adolescents. This finding aligns with multiple research conducted in various locations of Türkiye, indicating a consistent statewide tendency. A study investigating the impact of eHEALS on the health promotion activities of high school students showed a mean eHEALS score of 28.64±4.50, while another study examining its correlation

with healthy behaviors in adolescents revealed a mean score of 27.89±6.19 and a third research assessing the eHEALS levels of high school pupils in Türkiye found an average score of 27.52±6.76 (16-18). The results combined indicate a rather steady level of eHEALS across various geographical and socio-cultural situations in Türkiye. Minor disparities in mean scores may result from variations in sample characteristics, access to digital resources, or differences in health education settings.

In our study, mothers exhibited markedly superior HL scores compared to fathers across all HU-HL subdimensions and in the overall score. This finding aligns with prior studies emphasizing the more proactive involvement of mothers in child healthcare and decision-making processes. A study investigating the influence of parental health literacy on paediatric asthma outcomes reported that most participating caregivers were mothers (19). This predominance likely reflects the disproportionate burden of caregiving placed on women in many cultural contexts. Consequently, maternal health literacy may play a decisive role in shaping children's health behaviours and outcomes. Again in a study investigating HL among parents of children sent to a hospital in Iran indicated that 87% parents were mothers (20). Societal norms and conventional caring responsibilities in Türkiye may further exacerbate this inequality. In our sample, 84.8% of respondents were mothers, with a significant proportion being housewives, possibly enhancing their involvement in their adolescents healthcare. Moreover, the educational level of mothers in our sample was typically superior to that of fathers, a feature consistently linked to improved HL outcomes. These findings align with overarching trends in HL research, highlighting the impact of gender roles and socioeconomic factors, especially education, on HL levels.

Regarding the HU-HL subdimensions, our results were generally consistent with prior research conducted in Türkiye. For instance, research involving adolescents and parents indicated comparable or marginally elevated mean ratings in areas such as treatment accessibility and health promotion (21-23). The observed similarities enhance the generalizability of the HU-HL measure and indicate uniform health-related competencies among parents across various contexts.

The distribution of HL levels in our sample—21.2% low, 57.3% moderate, and 21.5% high—mirrors the patterns identified in other studies conducted in outpatient clinics and family health centers (24,25). Although the precise proportions may fluctuate marginally due to measurement instruments and demographic attributes, a steady trend of modest HL seems to endure across Turkish adult populations.

Our study revealed a significant and distinctive finding: parents of female adolescents exhibited markedly higher HL scores compared to parents of male adolescents, especially in the HU-HL subdimensions of Health Protection and Promotion, Access to Treatment and Health Services, as well as in the overall score. A study examining the health literacy levels of parents of adolescents attending a pediatric outpatient clinic at a tertiary adolescent's hospital for routine check-ups or illness revealed that 73.2% parents were mothers, with the majority demonstrating excellent HL (26). A study examining the HL levels of parents with adolescents admitted to a university hospital revealed that the majority of parents (65.0%) were mothers, and those who brought their daughters exhibited higher HL levels, categorized as adequate-excellent (27). Various contextual factors may have influenced this outcome. In our sample, the predominant parents who brought their adolescent to the hospital were mothers (84.8%), and they were more inclined to accompany daughters rather than males. Conversely, fathers (15.2%) more often accompanied sons than daughters. Furthermore, 69.9% of the mothers were housewife, indicating increased accessibility to attend medical appointments and potentially greater engagement in their adolescents healthcare. Previous studies have inadequately addressed the gender-specific approach in evaluating HL levels. This study aims to fill that gap.

The education level of parents may also be an influencing factor. Of the mothers surveyed, 34.4% completed primary school or less, 29.3% attained secondary school education, 27.0% finished high school, and 9.4% obtained university degrees. The reported figures were typically greater than those for fathers in our sample. Prior research indicates that mothers' insufficient or restricted HL can affect adolescent health outcomes, including the likelihood of home accidents (28). These findings suggest that lower maternal educational attainment, as observed in our sample, may be associated with insufficient HL, potentially increasing adolescents' vulnerability to adverse health outcomes.

Limitations of the Study

The exclusion of illiterate individuals in our study may have introduced bias, resulting in a sample skewed towards higher HL levels. This scenario originates from the HU-HL scale. The HU-HL scale is administered through a self-completion method under observation, rather than through face-to-face interaction with illiterate individuals.

CONCLUSION

This study provides novel evidence on the gender-based disparities in health literacy (HL) among adolescents and their parents, highlighting that parents of female adolescents demonstrated significantly higher HL scores than those of male adolescents. Consistent with national trends, adolescents showed moderate e-health literacy levels, and mothers consistently outperformed fathers across all subdimensions of the HU-HL scale. These findings underscore the importance of incorporating gender-sensitive approaches into HL interventions. Future public health strategies should prioritise tailored HL programmes, particularly targeting fathers and

caregivers of male adolescents, to reduce gender inequities and promote adolescent health more effectively.

The preliminary findings of the study (in Turkish) were presented as an oral presentation at the 25th National Public Health Congress, held in Antalya, Türkiye, between December 14–17, 2023. Based on the feedback and discussions during the congress, the study was further developed and enhanced with additional statistical analyses, including subgroup comparisons and multivariate modeling. A revised version of the research, focusing on the health literacy levels of adolescents and their parents, was prepared as an original manuscript.

Ethics committee approval

This study complies with the Declaration of Helsinki and was approved by the Scientific Research Ethics Committee of Health Sciences University Hamidiye (Date: 30.09.2022-Approval No: 2022/22).

Contribution of the authors

Study conception and design: ***MTU, BE, ÇN, SA;*** data collection: ***MTU, BE, ÇN;*** analysis and interpretation of results: ***MTU, SA, EÇ;*** draft manuscript preparation: ***MTU, EÇ, BE, ÇN***. All authors reviewed the results and approved the final version of the article.

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Conflict of interest

The authors declare that there is no conflict of interest.

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