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Health literacy about Gamma-hydroxybutyrate among Damietta University Students: A Cross-sectional Study

El-Bousraty Ahmed Mahmoud Mohamed[1*], Mustafa Ahmed Al-Metwalley[2], Elmagdy Ahmed Mohamed[2], Ibrahim Ahmed Ismail Yehia[2], Galal Ahmed Nagy[2], Mohamed Ahmed Hamdy Abd El-Hamed[2], Alsalseily Ahmed Ramadan Ibrahim[2], yaseen Hazem Ashraf elsayed[2], elsebaey Ahmed Mahmoud[2], Elghobary Ahmed Hossam[2], Eldeek, Basem[2]

1- Faculty of medicine Damietta University, New Damietta, Egypt. **(Corresponding Author)**
ahmedelbousraty@students.du.edu.eg
2- Faculty of medicine Damietta University.

Background and Objectives: This study aimed to measure health literacy about gamma-hydroxybutyrate among undergraduate students at Damietta University, Egypt, using Sørensen's Integrated Model of Health Literacy. The study also described students' information sources and compared prior awareness of gamma-hydroxybutyrate across faculty types.

Materials and Methods: A cross-sectional study was conducted in September and October 2025 using an online questionnaire completed by 365 undergraduate students from 14 faculties. The questionnaire assessed gamma-hydroxybutyrate-related awareness and item-level health literacy across the four competencies of Sørensen's model. Associations were tested with the chi-square test.

Results: Most participants were female (72.6%). The internet was the main source of information (76.8%). Although 48.8% reported prior awareness of gamma-hydroxybutyrate, only 25.6% of respondents to the detailed knowledge items recognized that it has both medical and recreational uses, and only 59.2% knew that it can be dissolved in drinks. Prior awareness differed significantly by faculty type ($p=0.001$), being highest in medical faculties (61.5%) and lowest in practical faculties (39.4%), and by academic level ($p<0.001$). Gender was not associated with prior awareness.

Conclusion: This study applies Sørensen's Integrated Model of Health Literacy to gamma-hydroxybutyrate-related information among Egyptian university students. The findings indicate that access to online information does not necessarily translate into understanding, appraisal or informed decision-making, supporting the need for evidence-based education and digital health-literacy interventions.

Keywords: Gamma-Hydroxybutyrate, Health Literacy, Awareness, Drug Education, University Students

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Introduction

Gamma-hydroxybutyrate (GHB) is a central nervous system depressant. Although pharmaceutical formulations are used in restricted clinical contexts, non-medical use can cause overdose, dependence and withdrawal, particularly when it is combined with alcohol or other sedatives (1-4). It has also been implicated in drug-facilitated sexual assault and in chemsex settings (5,6).

In Egypt, poison-control research and studies among university students have÷+-+-documented emerging-drug intoxications, substance-use patterns and associated risk factors, but these studies have generally examined substances collectively rather than GHB specifically (7-10). The Egyptian Drug Authority has restricted the unauthorized handling and circulation of GHB through Circular No. 153 of 2024 (11). Regulation alone, however, is unlikely to ensure that students can recognise reliable information, interpret risk and make safe decisions. University students are an important population because they may encounter drug-related information through peers and unverified online sources.

Health literacy provides an appropriate framework for examining this issue. Sørensen et al. (12) integrated existing definitions and models into the Integrated Model of Health Literacy, which defines health literacy as the knowledge, motivation and competencies needed to access, understand, appraise and apply health information. Access refers to seeking and obtaining information; understanding refers to comprehending it; appraisal refers to interpreting, filtering and judging it; and application refers to using it to make decisions and take action. Each competency operates across the healthcare, disease-prevention and health-promotion domains, creating a 12-dimension matrix **(Table 1).**

Table 1. Sørensen's Integrated Model of Health Literacy: four competencies across three health domains (adapted from Sørensen et al. (12))

Competency	Healthcare	Disease prevention	Health promotion
Access	Access information on medical or clinical issues	Access information on risk factors	Access information on health-related issues
Understand	Understand medical information and derive meaning	Understand information on risk factors and derive meaning	Understand health-related information and derive meaning
Appraise	Interpret and evaluate medical information	Interpret and evaluate information on risk factors	Interpret and evaluate health-related information
Apply	Make informed decisions on medical issues	Make informed decisions on risk factors	Make informed decisions on health-related issues

Previous research among university students has mainly examined general substance use or single drug classes rather than GHB-specific health literacy. Egyptian cross-sectional studies have reported patterns and correlates of substance use among students (8-10). Systematic-review and university-based research shows that health literacy is multidimensional and varies across student groups and information-processing competencies (13-16). However, no

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identified Egyptian study has applied Sørensen's framework to assess how university students access, understand, appraise and apply information specifically about GHB. This gap limits the development of targeted educational interventions.

Therefore, the purpose of this study was to measure health literacy about GHB among undergraduate students at Damietta University according to Sørensen's Integrated Model of Health Literacy, describe their information sources and compare prior awareness of GHB across faculty types.

Materials and Methods

Study design and setting

A cross-sectional study was conducted using an online survey of undergraduate students at Damietta University, Egypt, between September 27 and October 15, 2025.

Participants

Eligible participants were students enrolled in undergraduate programmes at Damietta University, from any faculty and academic level, who agreed to participate and completed the online questionnaire. Exclusion criteria were incomplete responses and duplicate responses identified during review of the exported Google Forms response sheet. The first complete eligible response was retained when a duplicate was identified.

Study instrument

Health literacy was conceptualised according to Sørensen's Integrated Model of Health Literacy, which comprises four competencies (access, understand, appraise and apply) across three health domains (healthcare, disease prevention and health promotion). Questionnaire items were developed after a literature review of related studies, mapped to the model and translated into Arabic by an independent professional translator. The Arabic questionnaire was administered; Appendix 1 provides an English version of every item and its response options.

The questionnaire comprised 23 items in two sections. Section 1 contained four sociodemographic items (age, gender, faculty and academic level). Section 2 contained 19 GHB-related items: access (3 items: prior awareness, sources of information and ease of understanding drug-related medical information), understand (5 items: classification of GHB, administration in drinks, addiction potential, use in drug-facilitated sexual assault and short-term effects), appraise (5 items: perceived frequency of GHB use among Egyptian youth, perceived exposure of medical students to correct information, perceived risk to university students, perceived effect of legal strictness and perceived danger of a drink from a stranger), apply (3 items: reaction to a GHB-related situation, sufficiency of knowledge for decision-making and support for curricular inclusion) and exposure (3 items: being offered GHB, knowing someone who tried it and witnessing suspected incapacitation at gatherings). Response formats were yes/no (6 items), yes/no/I do not know (3 items), true/false/I do not

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know (3 items), single-choice (2 items), multiple-response (1 item), a five-point agreement scale (3 items) and a four-point frequency scale (1 item).

Items were analysed separately because the questionnaire contained knowledge, perception, behavioural-intention and exposure items rather than a validated unidimensional scale. For knowledge items, the correct responses were 'both recreational and medical' for GHB classification and 'true' for the three true/false items. Agreement-scale items were coded as favourable when respondents selected agree or strongly agree. For the four-point frequency item, responses of never or rarely were coded as difficulty understanding drug-related medical information. Table 2 reports the favourable or competent response consistently in every cell, together with the numerator and denominator. No composite GHB literacy score was calculated. Each item was assigned to one competency **(Appendix 1)** and, for the items summarised in Table 2, to one health domain; the item numbers are shown in Table 2. Items 13, 14 and 18 measured exposure and were reported separately from the four competencies.

Faculty type was classified by the primary disciplinary orientation of the faculty: medical (health and clinical disciplines), practical (laboratory, technical or field-based disciplines) and theoretical (humanities, social science, education or business disciplines). Prior awareness of GHB was measured with item 5 ('Have you ever heard of GHB?') and analysed as a binary outcome (yes/no); 178 respondents (48.8%) reported prior awareness. This outcome is labelled prior awareness throughout the manuscript and is not interpreted as a composite GHB literacy score. Because no composite scale was calculated, Cronbach's alpha is not reported.

Table 2. Summary of GHB health literacy across Sørensen competencies and health domains (% of respondents with the competent or favorable response)

Health domain	Access	Understand	Appraise	Apply
Healthcare	No questionnaire item mapped to this cell	Recognized both medical and recreational use: 25.6% (54/211) (item 7)	Considered GHB use a common problem among Egyptian youth: 36.0% (76/211) (item 9)	Felt they had enough knowledge to make a correct decision: 31.0% (113/365) (item 21)
Disease prevention	Prior awareness of GHB: 48.8% (178/365) (item 5)	Knew GHB can be dissolved in drinks: 59.2% (125/211) (item 8)	Agreed that university students are at risk of trying GHB: 41.2% (87/211) (item 19)	Would refuse use if offered: 81.4% (297/365) (item 15)
Health promotion	No difficulty understanding medical literature on drugs: 22.5% (82/365) (item 23)	Recognized link with drug-facilitated sexual assault and chemsex: 73.5% (155/211) (item 16)	Believed legal and regulatory strictness reduces GHB use: 74.9% (158/211) (item 20)	Supported drug education in university curricula: 86.0% (314/365) (item 12)

Note: Every cell reports the share of respondents giving the competent or favourable response, with n/denominator in brackets. The denominator is shown because item-level analyses used different analytic samples. The table uses one response direction throughout: a higher percentage represents greater competence or a more favourable response. Item numbers refer to Appendix 1. No questionnaire item was mapped to the Access-healthcare cell; items 6, 17 and 22 are reported in the text.

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Sampling and sample size

The target population was undergraduate students at Damietta University. The minimum sample size was 329, calculated with an online sample size calculator (calculator.net) assuming a 95% confidence level, a 5% margin of error and a response distribution of 50%. Participants were recruited through non-probability convenience sampling. To allow for incomplete and duplicate responses, a larger sample was collected, and 365 responses were analyzed.

Data collection

The questionnaire was administered in Arabic as a Google Form and distributed to students through WhatsApp.

Ethical considerations

The study followed the Declaration of Helsinki (17). The questionnaire was anonymous and collected no names. A statement on its first page explained the purpose of the study and the confidentiality of the data, and completing the questionnaire was taken as consent to participate. The Institutional Review Board of Damietta University approved the study (DURec No. 230, September 24, 2025).

Statistical analysis

Categorical variables were summarised as frequencies (n) and percentages (%), and age was summarised as mean and standard deviation. The chi-square test was used to examine associations between prior awareness of GHB and faculty type, academic level and gender. A p-value below 0.05 was considered statistically significant. Analyses were performed using IBM SPSS Statistics version 20.

Results

Participant characteristics

A total of 365 students completed the survey. Participant characteristics are shown in **Table 3**. By faculty type, 33.4% (n=122) were in medical faculties, 49.3% (n=180) in practical faculties and 17.3% (n=63) in theoretical faculties. The largest groups came from the Faculty of Agriculture (35.9%, n=131) and the Faculty of Medicine (33.2%, n=121). Most participants were female (72.6%, n=265), and the mean age was 20.13 ± 1.742 years. Levels 1 and 5 were the most common academic levels (31%, n=113 each; **Figure 1**).

Table 3. Sociodemographic characteristics of participants (N = 365)

Characteristic	n	%
Gender		
Female	265	72.6
Male	100	27.4
Age, years (mean ± SD)	20.13 ± 1.742	
Faculty type (curriculum orientation)		

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Medical	122	33.4
Practical	180	49.3
Theoretical	63	17.3
Faculty		
Agriculture	131	35.9
Medicine	121	33.2
Nursing	1	0.3
Science	31	8.5
Engineering	11	3.0
Physical education	1	0.3
Applied arts	3	0.8
Computers & IT	3	0.8
Commerce	12	3.3
Arts	2	0.5
Specific education	1	0.3
Archaeology	0	0.0
Laws	3	0.8
Education	45	12.3
Academic level		
Level 1	113	31.0
Level 2	42	11.5
Level 3	31	8.5
Level 4	66	18.1
Level 5	113	31.0

Note: Faculty type was classified by curriculum orientation: medical (health and clinical disciplines), practical (laboratory, technical or field-based disciplines) and theoretical (humanities, social science, education or business disciplines). Percentages are calculated from N = 365 and rounded individually. Females made up 66.4% of medical, 68.9% of practical and 95.2% of theoretical faculty respondents.

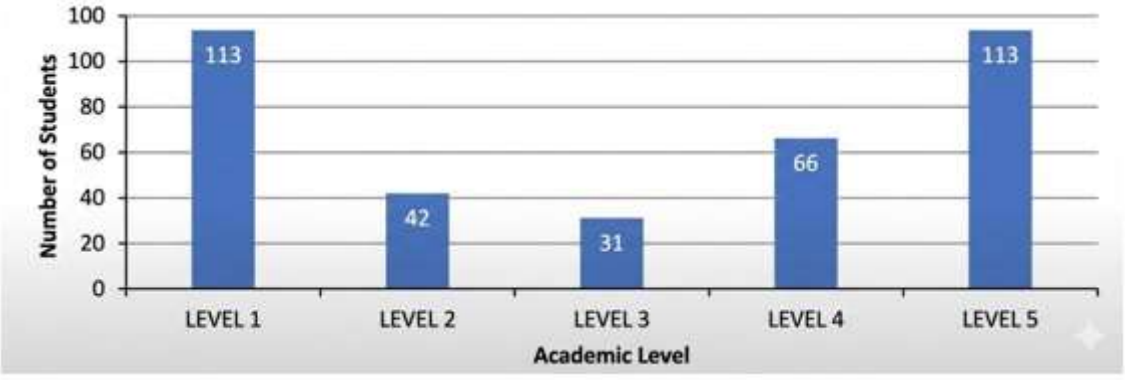


Figure 1. Distribution of students according to academic level

General health literacy

Health literacy was examined at item level across the four competencies and three health domains of Sørensen's model **(Table 2).** Every cell reports the percentage of respondents giving the competent or favourable response, and its numerator and denominator are shown.

Detailed GHB knowledge and perception items were analysed using the available responses for each item; these analyses had a denominator of 211 respondents. Percentages in the text likewise refer to the competent or favourable response, as in Table 2.

Access. Prior awareness of GHB was reported by 48.8% (n=178) of the total sample. Digital platforms were the main source of information (76.8%, n=162 of 211). Separately, only 22.5% (n=82) of the total sample reported no difficulty understanding drug-related medical information from the internet or books (a general drug-information item that was not specific to GHB).

Understand. Only 25.6% (n=54) recognized that GHB has both medical and recreational uses. Acute side effects such as drowsiness and loss of consciousness were recognized by 67.3% (n=142), and 59.2% (n=125) knew that GHB can be dissolved in drinks. Its association with drug-facilitated sexual assault and chemsex was recognized by 73.5% (n=155).

Appraise. Only 36% (n=76) considered GHB use a common problem among young people in Egypt, whereas 74.9% (n=158) believed that legal and regulatory strictness reduces its spread. A minority (41.2%, n=87) agreed that university students are at risk of trying substances such as GHB, and 64.0% (n=135) considered a drink accepted from a stranger a high-risk situation because it might contain GHB.

Apply. Most (81.4%, n=297) said they would refuse to use it, but only 31.0% (n=113) felt they had enough information to make an informed decision if exposed. A large majority (86%, n=314) considered it necessary to include GHB and drug addiction in university curricula.

Exposure. Exposure items were reported separately because they are not part of the four competencies. Almost all respondents (98.6%, n=360) reported no personal or social contact with GHB.

Inferential statistics

Prior awareness of GHB differed significantly by faculty type (p=0.001; **Table 4**): 61.5% of medical students, 50.8% of theoretical-faculty students and 39.4% of practical-faculty students reported prior awareness. Prior awareness also differed by academic level ($p < 0.001$). Gender was not significantly associated with prior awareness (p=0.857) or with awareness of drug-facilitated sexual assault (p=0.596). Academic level was not associated with the ability to understand medical references (p=0.917), and information source was not associated with accurate knowledge of short-term effects (p=0.880). Difficulty understanding drug-related medical information was significantly associated with not feeling able to make an informed decision about GHB exposure (p=0.001), whereas prior awareness was not associated with identifying a drink from a stranger as high risk (p=0.905).

Table 4. Association between prior awareness of GHB and faculty type among respondents

Prior awareness of GHB	**Theoretical n (%)**	**Practical n (%)**	**Medical n (%)**	**Total n (%)**
No	31 (49.2)	109 (60.6)	47 (38.5)	187 (51.2)

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Yes	32 (50.8)	71 (39.4)	75 (61.5)	178 (48.8)
Total	63 (100.0)	180 (100.0)	122 (100.0)	365 (100.0)

Chi-square test, p = 0.001

Discussion

This study used item-level measures mapped to Sørensen's framework to examine how students engage with information about GHB. The pattern suggests that access to information does not automatically translate into understanding, appraisal or informed decision-making. This distinction is important because health literacy concerns the ability to use information, not simply whether information is encountered.

Direct comparisons with GHB-specific health-literacy studies are limited because most student research has examined substance use rather than GHB-related information competencies. In Egypt, Naguib et al. (8), Khafagy et al. (9) and Kabbash et al. (10) documented substance-use patterns and correlates among university students. Those studies establish the public-health relevance of student-focused prevention but do not assess the four competencies of accessing, understanding, appraising and applying GHB-related information. The present study therefore adds a framework-based description rather than a directly comparable prevalence estimate of substance use.

The findings are consistent with wider health-literacy research showing that university students may experience difficulty in specific information-processing competencies even when they can access health information. Dadaczynski et al. (18) found that university students had particular difficulty evaluating the reliability of online health information. Yin et al. (15) reported associations between health literacy and alcohol-use behaviour among medical students, while Adeoya (16) found dimension-specific health-literacy gaps in a large university-student sample. Differences in setting, questionnaire design and substance focus mean that numerical comparisons should be made cautiously, but together these studies support educational approaches that strengthen both critical appraisal and decision-making skills.

The observed faculty-type differences should also be interpreted cautiously. Previous Egyptian studies have reported differences in substance-related outcomes across medical, practical and theoretical faculties (9,10). However, the present outcome is prior awareness rather than a composite literacy score, and the cross-sectional design cannot establish whether differences result from curriculum exposure, information access or other factors. The faculty groups also differed in gender composition (females: 66.4% in medical, 68.9% in practical and 95.2% in theoretical faculties). Gender was not associated with prior awareness

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overall (p=0.857), but no multivariable adjustment was performed, so the higher awareness in theoretical than in practical faculties may partly reflect sample composition.

The results support an education strategy that goes beyond warning messages. Students need clear, evidence-based information about GHB, guidance on assessing the credibility of online sources and practical preparation for making safer decisions in social situations. Future research should use a validated GHB-specific instrument or develop and validate a multi-item measure aligned with Sørensen's model before estimating a composite literacy score.

The study's findings should be interpreted as a description of item-level awareness and health-information competencies in one university sample. They should not be interpreted as estimates of GHB use, national prevalence or causal effects of faculty type. This framing is important when comparing the results with studies that measure actual substance use or use validated health-literacy scales.

The faculty and academic-level patterns nevertheless identify groups that may benefit from tailored education. Future intervention studies should assess whether curriculum-based and digital-health-literacy approaches improve students' ability to access, understand, appraise and apply evidence about GHB.

Implications

The strong support for curricular inclusion suggests that evidence-based education may be acceptable to students. Interventions should provide accurate information about GHB, teach students how to evaluate online sources and use realistic scenarios to develop safer decision-making. Such education should complement, rather than be replaced by, national regulatory measures.

Implications and Future Research: A strength of this study is its use of a recognised theoretical model to organise item-level assessment across four health-literacy competencies. The inclusion of students from multiple faculties also permitted comparison of awareness and selected health-information measures across disciplinary groups.

Several limitations should be acknowledged. The cross-sectional design precludes causal inference. Convenience sampling, the over-representation of females and of certain faculties, and the single-university setting limit generalisability. Self-reported responses on a sensitive topic may be affected by recall and social-desirability bias. Uneven participation across faculties reduced statistical power for subgroup analyses. The questionnaire included knowledge, perception, behavioural-intention and exposure items mapped to Sørensen's competencies, but it was not a validated health-literacy scale and no composite score was calculated. The assignment of items to competencies and health domains was based on the authors' judgement. Item-level denominators also varied, so the basis for each estimate is reported in the tables.

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Conclusion

This cross-sectional study identified gaps in university students' GHB-related knowledge and health-information competencies. Access to online information did not consistently correspond to understanding or confidence in making informed decisions. The findings support evidence-based education that strengthens critical appraisal of online information and practical decision-making about GHB. Future research should use a validated GHB-specific measure to examine health literacy more precisely and to evaluate the impact of educational interventions.

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Availability of data and materials: The datasets generated and analysed during the current study are available from the corresponding author on reasonable request.

Conflict of interest: The authors declare that they have no conflicts of interest related to this research.

Consent for publication: Not applicable.

Ethics approval and consent to participate: The study followed the Declaration of Helsinki and was approved by the Institutional Review Board of Damietta University (DURec No. 230, September 24, 2025). Participation was voluntary and anonymous. A statement on the first page of the online questionnaire explained the purpose of the study and the confidentiality of the data, and completing the questionnaire was taken as consent to participate.

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References

1. Busardò FP, Jones AW. GHB pharmacology and toxicology: acute intoxication, concentrations in blood and urine in forensic cases and treatment of the withdrawal syndrome. Curr Neuropharmacol. 2015;13(1):47-70. https://doi.org/10.2174/1570159X13666141210215423 PMid:26074743 PMCid:PMC4462042

2. McDonough M, Kennedy N, Glasper A, Bearn J. Clinical features and management of gamma-hydroxybutyrate (GHB) withdrawal: a review. Drug Alcohol Depend. 2004;75(1):3-9. https://doi.org/10.1016/j.drugalcdep.2004.01.012 PMid:15225884

3. Tay YL, Mannaert E, Tytgat J. Gamma-hydroxybutyrate (GHB) toxicity: mechanisms and management. Clin Toxicol. 2022;60(4):423-35.

4. Dufayet L, Bargel S, Bonnet A, Boukerma AK, Chevallier C, Evrard M, et al. Gamma-hydroxybutyrate (GHB), 1,4-butanediol (1,4BD), and gamma-butyrolactone (GBL) intoxication: a state-of-the-art review. Regul Toxicol Pharmacol. 2023;142:105435. https://doi.org/10.1016/j.yrtph.2023.105435 PMid:37343712

5. Anderson LJ, Flynn A, Pilgrim JL. A global epidemiological perspective on the toxicology of drug-facilitated sexual assault: a systematic review. J Forensic Leg Med. 2017;47:46-54. https://doi.org/10.1016/j.jflm.2017.02.005 PMid:28284121

In Press

6. Maxwell S, Shahmanesh M, Gafos M. Chemsex behaviours among men who have sex with men: a systematic review of the literature. Int J Drug Policy. 2019;63:74-89. https://doi.org/10.1016/j.drugpo.2018.11.014 PMid:30513473
7. El-Sarnagawy GN, El-Sayed EM, Abdel-Rahman MS. Emerging drugs of abuse in Egypt: a poison control center-based study. Egypt J Forensic Sci. 2019;9(1):1-8.
8. Naguib YM, Sherif HA, Elbalshy AT, Edrees EA, Sabry AE, Sharif AF, et al. Prevalence and associated risk factors of cannabinoid abuse among Egyptian university students: a cross-sectional study. Environ Sci Pollut Res Int. 2021;28(48):68706-16.https://doi.org/10.1007/s11356-021-15412-1 PMid:34273073 PMCid:PMC8285707
9. Khafagy M, Gomaa Z, Elwasify M. Substance use patterns among university students in Egypt. Middle East Curr Psychiatry. 2021;28:59. https://doi.org/10.1186/s43045-021-00140-6
10. Kabbash IA, Zidan OO, Saied SM. Substance abuse among university students in Egypt: prevalence and correlates. East Mediterr Health J. 2022;28(1):31-40. https://doi.org/10.26719/emhj.22.001 PMid:35165876
11. Egyptian Drug Authority. Circular No. 153 of 2024 (Internet). 2024 (cited 2026 Jan 23). Available from: https://www.edaegypt.gov.eg
12. Sørensen K, Van den Broucke S, Fullam J, Doyle G, Pelikan J, Slonska Z, et al. Health literacy and public health: a systematic review and integration of definitions and models. BMC Public Health. 2012;12:80. https://doi.org/10.1186/1471-2458-12-80 PMid:22276600
13. Kühn L, Bachert P, Hildebrand C, Kunkel J, Reitermayer J, Wäsche H, et al. Health literacy among university students: a systematic review of cross-sectional studies. Front Public Health. 2022;9:680999. https://doi.org/10.3389/fpubh.2021.680999 PMid:35127605 PMCid:PMC8814326
14. Bánfai-Csonka H, Bánfai B, Jeges S, Betlehem J. Understanding health literacy among university health science students of different nationalities. Int J Environ Res Public Health. 2022;19(18):11758. https://doi.org/10.3390/ijerph191811758 PMid:36142030 PMCid:PMC9517253
15. Yin M, Yangyuen S, Somdee T. The relation of social-ecological factors and health literacy to medical students' alcohol use behavior in Hubei Province, China. J Res Health Sci. 2023;23(4):e00599. https://doi.org/10.34172/jrhs.2023.134 PMid:38315914 PMCid:PMC10843315
16. Adeoya AA. Exploring health literacy among Japanese and international university students in Japan: a comparative cross-sectional study. J Migr Health. 2025;11:100334. https://doi.org/10.1016/j.jmh.2025.100334 PMid:40453445 PMCid:PMC12124658
17. World Medical Association. World Medical Association Declaration of Helsinki: ethical principles for medical research involving human subjects. JAMA. 2013;310(20):2191-4. https://doi.org/10.1001/jama.2013.281053 PMid:24141714
18. Dadaczynski K, Okan O, Messer M, Leung AYM, Rosário R, Darlington E, et al. Digital health literacy and web-based information-seeking behaviors of university students in Germany during the COVID-19 pandemic: cross-sectional survey study. J Med Internet Res. 2021;23(1):e24097. https://doi.org/10.2196/24097 PMid:33395396 PMCid:PMC7813561

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