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Original Article

A survey of the Attitudes of Students at Ilam University of Medical Sciences Toward Electronic Tests

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Abstract

Background: Electronic tests are one of the consequences of the influence of technology in education. Given the pivotal role of students, an awareness of their attitudes toward electronic tests can help improve the quality of these tests. This study aimed to investigate the attitudes of students at Ilam University of Medical Sciences toward electronic tests.

Methods: This descriptive cross-sectional study was conducted on 205 students at Ilam University of Medical Sciences in western Iran in 2021. The students were selected through multi-stage sampling. Data were collected using a demographic information form and a researcher-made questionnaire to examine students' attitudes toward electronic tests. The collected data were analyzed using SPSS-22 software.

Results: The data showed that 51.4% of the students had positive attitudes about the use of electronic tests, 31.0% had negative attitudes, and 17.6% of the students had no opinion. Furthermore, 61.7% of students had relatively positive attitudes toward the structure and system of electronic tests, 41.4% were positive about the compatibility of tests with the teaching model and the nature of their fields of study, 55.8% expressed positive views about test security and its stressors, 44.4% of the students proposed solutions to improve the quality of electronic tests, and 53.6% of the students had moderately positive attitudes toward electronic tests compared to paper and pencil tests.

Conclusion: The findings suggested that more than half of the students had positive attitudes toward electronic tests and their five dimensions. Accordingly, educational managers and planners need to develop a suitable framework and set requirements for improving the electronic infrastructure for administering electronic tests.

Keywords: Electronic learning, Electronic tests, Students, Ilam

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Introduction

The development of higher education is one of the significant issues of distance education (1). The increasing growth of information and communication technology (ICT) makes the use of new evaluation methods inevitable for evaluating learners (2). Accomplishing the educational goals, in addition to providing a suitable place, requires the production of educational materials and the provision of the necessary human resources to measure and evaluate what has been learned using various tests (3,4). Since education has gradually turned into an industry, the concepts of value, value creation, and value chains in conventional education need to be revised (5). The use of the Internet and multimedia technologies has directed conventional learning to e-learning, which has an important effect on teaching and learning opportunities in different educational settings. Currently, electronic education is defined as any use of electronic technology to provide educational content and one of its components is the assessment and evaluation of learners (6).

Electronic education makes learning happen adaptively and interactively, reduces the costs of education, and makes education more flexible. In addition, it provides access to education at any hour of the day and night (7). Electronic tests are effective for diagnostic, descriptive, and summative evaluation, can be easily administered to a large number of students, and will enable students to demonstrate their performance. Conventional tests, including paper and pencil tests, bring a lot of financial and labor burdens for learners and teachers (8). Electronic tests bring advantages such as test security, safe data storage, immediate test results, cost-effectiveness, saving time, and automatic registration of records for students, teachers, institutes, and universities (2). The administration of electronic tests, especially during scoring and interpretation, is more reasonable and economical

than conventional tests (9). Other benefits of electronic tests include eliminating the possibility of mistakes when completing the question paper, reducing the mistakes of teachers and evaluators in the manual marking of students' papers, removing bias related to the students' handwriting, and enhancing the ability to integrate and interpret the test in the best way possible (2,10).

Electronic tests have many advantages, but due to the fear of cheating, many teachers do not administer electronic tests, even if they are less expensive and easier to manage. However, electronic tests involve several challenges, including increased work in the preparation phase, inaccessibility of computers and the Internet, the possibility of technical failure, security issues, psychological issues caused by technology anxiety, and coping with cheating (11,12). Other problems reported in recent studies were the elimination of face-to-face communication, focusing on memorization, declining students' creativity, the lack of written guidelines, and the absence of a clear administration procedure (13,14).

Cluskey et al. and Backman et al. proposed a set of frameworks and control methods for electronic tests that greatly reduce the ability of students to cheat (15,16). These methods include controlling the administration of the exam only at a specific time, random arrangement of exam questions, presenting exam questions only once, setting a limited time for the test, students accessing the system only once, requiring students to use a special Internet browser to complete the test, and requiring teachers to change at least one-third of the multiple-choice/objective questions on each exam per semester (15-18).

Given the novelty of electronic tests compared to conventional testing procedures, their administration is associated with problems and limitations in many cases. Thus, recognizing and resolving these problems can speed up the administration of electronic tests (1). Furthermore, due to the COVID-19 pandemic, academic education and exams in most universities around the world were held electronically; such electronic tests may be widely administered in the future as well due to similar pandemic conditions (18). Given the vital role of students in the educational system, assessing students' attitudes can play a decisive role in identifying the strengths and weaknesses of the electronic test system. However, this issue has been rarely addressed in previous studies (2). To this end, the present study sought to examine the attitudes of students at Ilam University of Medical Sciences toward electronic tests.

Materials and Methods

The present study adopted a descriptive cross-sectional design. The sample size was estimated using Cochran's formula ($n = z^2 \times p\ (1\text{-}p)/d^2$), taking into account a 95% confidence interval, a sampling accuracy of 0.05, and a population homogeneity rate of 0.5. The inclusion criteria were: (a) studying at Ilam University of Medical Sciences in 2021, (b) attending electronic tests administered in the current semester, and (c) willingness to participate in the study and completing an informed consent form. The participants were selected through multi-stage sampling. To do so, some classes were selected randomly from each faculty and several students in each class were selected using a list of students in the same class. The selected students were asked to complete the items in the questionnaire made available to them through a link posted on WhatsApp or Telegram.

Data were collected using a demographic information form and a research-made questionnaire to assess students' attitudes toward electronic tests. The items in the self-report instruments were completed by the students through a link posted on WhatsApp or Telegram. The demographic information form contained 19 items to assess the participants' age, gender, marital status, employment records, place of residence, academic semester, faculty, academic program, experience of participating in electronic tests, Grade Point Average (GPA), residence status, family residence, number of credits taken in the current semester, GPA in the last semester, number of credits not taken in the last semester, and number of credits not passed in all semesters.

The students' attitudes toward electronic tests survey contained 33 items that measured five dimensions: The test structure and system (items 5 and 6), the compatibility of the test with the teaching model and the nature of the field of study (items 2, 3, 7, 18, 24, 30, and 31), test security and stressors (items 8, 15, 19, 20, 22, 23, and 25), solutions to improve electronic tests (items 10, 16, 26, 29, and 32), and comparison of electronic and paper and pencil tests (items 4, 9, 11, 12, 13, 14, 17, 21, 27, and 28). The survey items were developed based on a review of previous studies in the literature (19, 20). The items were completed on a five-point Likert scale (1 = strongly disagree, 2 = disagree, 3 = undecided, 4 = agree, and 5 = strongly agree). The validity of the instrument was assessed and confirmed by 20 faculty members at Ilam University of Medical Sciences (6 persons from the Faculty of Nursing, 7 from the Faculty of Medicine (Medicine and Basic Sciences), 2 from the Faculty of Dentistry, 3 from the Faculty of Paramedical Medicine, and 2 persons from the Faculty of Health (Epidemiology and Statistics). The content validity index (CVI = 80%) was assessed using Waltz and Bausell's (1981) method and the content validity ratio (CVR = 75%) was assessed using Lawshe's method. The reliability of the instrument was assessed and confirmed with Cronbach's alpha of 0.8.

Data analysis

The collected data were analyzed with SPSS-23 software using descriptive and inferential statistics (mean, standard

deviation, frequency, percentage, t-test, and ANOVA) at a significance level of $P < 0.05$.

Ethical considerations

The protocol for this study was approved with the code of ethics IR.MEDILAM.REC.1400.162 by the research council and the ethics committee of Ilam University of Medical Sciences. Moreover, the data were collected with full compliance with ethical protocols after informing the participants about the objectives of the study and completing an informed consent form.

Results

The mean age of the participants was 22.98 ± 3.72 years. Besides, the number of credits taken in the last semester was 18.86 ± 2.78 and the number of unpassed credits in all semesters was 1.63 ± 3.98. Furthermore, the GPA of the students in the last semester was 16.52 ± 1.36 out of 20 and the GPA of the participants during all the semesters was 15.99 ± 1.34 out of 20. The data also showed 62% of the participants were female, 51.9% were nursing students, 18% were studying in the sixth semester, 52.2% were studying at the Faculty of Nursing and Midwifery, 82.9% were completing their bachelor's program, 96.1% were tuition-free students, 0.99% attended electronic tests in the past, and 61% of the students were living in dormitories (Table 1).

Generally, the data shows that 51.4% of the students have positive attitudes toward the use of electronic tests, 31.0% have negative attitudes, and 17.6% have no opinion. The data showed that more than 50% of the students had positive attitudes and 24.3% of them had negative attitudes toward the structure and system of the electronic tests. Moreover, a majority of students (78.6%) believed in the easy login to the electronic test system and easy administration of electronic tests. In addition, 32.7% of the students believed in the unsuitability of the layout design of the electronic testing screen and window. The findings also indicated that 41.4% of the students had positive attitudes toward the fitness between electronic tests, the teaching methods, and their field of study, while 40.4% of the students disagreed with this statement. Furthermore, 57% of the students agreed that electronic tests were effective for both mid-term and final exams and 55.6% of the students disagreed with the fitness of electronic tests with professors' teaching styles (Table 2). In addition, more than 50% of the students agreed with the security and stressors of electronic tests and 22.7% of the students expressed their negative attitudes toward it. The findings also suggested that 58.9% of the students believed that there is less time for some computational questions in electronic tests and 41.5% of the students disagreed that most questions in electronic tests are usually answered by a certain group of students. Furthermore, 44.4% of the students had positive attitudes and 36.6% had negative attitudes toward the solutions to improve electronic tests. Accordingly, 80.4% of the students suggested that the inclusion of additional questions in electronic tests and the possibility of revising answered questions can reduce students' concerns and provide a more effective evaluation of students. However, 55.6% of the students disagreed that the use of essay-type questions could improve the evaluation of students' performance (Table 2).

A comparison of electronic and paper and pencil tests indicated more than 50% of the students had positive attitudes and 30.5% had negative attitudes. Furthermore, 53.6% of the students believed that scoring electronic tests is easier and faster than paper and pencil tests and 55.6% of the students disagreed with more accuracy in answering

Table 1. The descriptive statistics for the students' demographic variables

Variables	Categories	Frequency (%)
Gender	Female	127 (62.0)
	Male	78 (38.0)
Field of study	Nursing	106 (51.9)
	Ph.D.	28 (13.6)
	Health engineering	37 (18.0)
	Paramedicine	34 (16.5)
Academic semester	1	14 (6.8)
	2	20 (9.8)
	3	17 (8.3)
	4	34 (16.5)
	5	30 (14.6)
	6	37 (18.0)
	7	21 (10.2)
	8	22 (10.8)
	10	5 (2.5)
	11	2 (1.0)
	12	3 (1.5)
Faculty	Nursing & Midwifery	107 (52.2)
	Health	37 (18)
	Medicine	20 (9.8)
	Dentistry	9 (4.4)
	Paramedicine	32 (15.6)
Academic program	Ph.D.	29 (14.1)
	Master's program	3 (1.5)
	Bachelor's program	170 (82.9)
	Associate's program	3 (1.5)
Type of program	Tuition-free	197 (96.1)
	Tuition-paid	8 (3.9)
History of taking electronic tests?	Yes	203 (99.0)
	No	2 (1)
Residence	Local	2 (1)
	Dormitory	125 (61)
	Other	78 (61)

Table 2. The students' attitudes toward electronic tests

Dimensions	Statements	Strongly disagree	Disagree	Undecided	Agree	Strongly agree
		No. (%)	No. (%)	No. (%)	No. (%)	No. (%)
The structure of the testing system	Easy login to the electronic test system	11 (5.3)	23 (11.2)	10 (4.9)	101 (49.3)	60 (29.3)
	The good design of the screen and window of the electronic test system	25 (12.1)	42 (20.5)	36 (17.6)	71 (34.6)	31 (15.2)
	Suitability of color and configuration of the system for electronic tests	17 (8.3)	32 (15.7)	39 (19)	78 (38)	39 (19)
	Total	8.61	15.77	13.84	40.65	21.13
The compatibility of electronic tests with teachers' teaching styles	New learning with electronic tests	28 (13.7)	46 (22.4)	32 (15.7)	62 (30.2)	37 (18)
	Fitness of electronic tests with professors' teaching styles	51 (24.9)	63 (30.7)	25 (12.2)	41 (20)	25 (12.2)
	Suitability of electronic tests for testing students	51 (24.9)	56 (27.3)	19 (9.3)	47 (22.9)	32 (15.6)
	The inappropriateness of electronic tests due to the lack of a variety of questions	52 (25.3)	53 (25.9)	46 (22.5)	33 (16.1)	21 (10.2)
	Superficial evaluation in electronic tests with no new questions	28 (13.7)	(18) 37	62 (30.2)	45 (22)	33 (16.1)
	The suitability of electronic tests only for mid-term exams	25 (12.2)	42 (50.5)	36 (17.6)	71 (34.65)	31 (15.1)
	The suitability of electronic tests for both mid-term and final exams	17 (8.3)	32 (15.6)	39 (19)	78 (38.1)	39 (19)
	Total	17.58	22.92	18.04	26.27	15.19
The security of electronic tests and their stressors	Confidence in the security of electronic tests	33 (16.1)	33 (16.1)	47 (22.9)	54 (26.4)	38 (18.5)
	Computers are more secure than mobile phones	21 (10.2)	17 (8.3)	67 (32.8)	66 (32.25)	34 (16.5)
	Concerns about system inefficiency and cheating in electronic tests	25 (12.2)	21 (10.2)	41 (20)	56 (27.3)	62 (30.35)
	Increasing the stress of electronic tests with technical problems	11 (5.4)	14 (6.8)	21 (10.2)	58 (28.4)	101 (49.2)
	Supportive attitudes in electronic tests	23 (11.13)	30 (14.6)	63 (30.7)	52 (25.4)	37 (18)
	Electronic exam questions are only answered by a specific group of students	34 (16.5)	51 (24.9)	53 (25.9)	38 (18.5)	29 (14.2)
	Lack of time for computational questions in electronic tests	6 (2.9)	7 (3.4)	16 (7.8)	58 (28.35)	118 (57.6)
	Total	10.66	12.05	21.47	26.63	29.19
Solutions to improve electronic tests	Assessing students' knowledge with a variety of electronic exam questions	59 (28.8)	49 (23.8)	27 (13.2)	42 (20.5)	28 (13.7)
	Effective evaluation of students with essay-type questions on electronic tests	63 (30.7)	51 (24.9)	38 (18.5)	38 (18.5)	15 (7.4)
	The effect of reducing the time to answer questions in decreasing cheating on electronic tests compared to paper and pencil tests	53 (25.9)	49 (23.9)	32 (15.6)	34 (16.6)	37 (18)
	Reducing students' anxiety with optional questions and returning to answered questions	9 (4.3)	6 (2.9)	25 (12.2)	76 (37.1)	89 (43.5)
	Increasing motivation and deep learning by developing new questions	18 (8.8)	19 (9.3)	71 (34.65)	70 (34.1)	27 (13.2)
	Total	19.0	16.97	18.83	25.37	19.13
Comparing electronic and paper and pencil tests	The cost-effectiveness of electronic tests compared to paper and pencil tests	16 (7.8)	16 (7.8)	21 (10.2)	74 (36.1)	78 (38.1)
	Effective evaluation of knowledge on electronic tests than paper and pencil tests	54 (26.3)	36 (17.6)	36 (17.6)	47 (22.9)	32 (15.6)
	More security in electronic tests than in paper and pencil tests	49 (23.9)	37 (18)	36 (17.6)	46 (22.5)	37 (18)
	More accuracy in answering the questions on electronic tests compared to paper and pencil tests	54 (26.3)	60 (29.3)	26 (12.7)	33 (16.1)	32 (15.6)
	Faster marking of electronic tests compared to paper and pencil tests	11 (5.4)	13 (6.4)	22 (10.7)	70 (34.1)	89 (43.45)
	More satisfaction with electronic tests than paper and pencil tests	37 (18)	39 (19)	32 (15.6)	56 (27.4)	41 (20)
	More stress from electronic tests than paper and pencil tests	18 (8.8)	26 (12.7)	24 (11.7)	63 (30.7)	74 (36.1)
	Easier to cheat on electronic tests than on paper and pencil tests	35 (17.15)	29 (14.1)	43 (21)	40 (19.5)	58 (28.35)
	Paper and pencil tests are fairer than electronic tests	20 (9.8)	27 (13.2)	43 (21)	62 (30.2)	53 (35.9)
	Unrealistic results of electronic tests compared to paper and pencil tests	20 (9.8)	30 (14.6)	39 (19)	65 (31.7)	52 (24.9)
	Total	15.31	15.26	15.70	27.12	26.61
The students' overall attitudes toward electronic tests		14.38	16.59	17.58	29.20	22.25

questions on electronic tests compared to paper and pencil tests. Overall, more than 50% of the students had positive attitudes and 30.9% had negative attitudes toward the use of electronic tests (Table 2).

The data showed no statistically significant relationship between the students' overall attitudes toward electronic tests and their demographic variables (Table 3).

Discussion

The present study examined the attitudes of students at Ilam University of Medical Sciences toward electronic tests. The findings indicated that more than half of the students had positive attitudes toward the use of electronic tests. Currently, the integration of e-learning in educational and learning processes in higher educational institutions is inevitable (21). Electronic education is an important part of higher education, and understanding the users' perspective on this type of education will provide a better learning environment (22). Furthermore, an awareness of the prerequisites, programs, existing capabilities, strengths, weaknesses, opportunities, and threats in educational settings where electronic tests are to be administered (23) and issues such as the audience needs, review, evaluation, modification, changing testing materials, and creating communities of learners to build knowledge will guarantee these successes (24). The insights from this study are valuable for most universities and higher education institutions that welcome electronic tests.

More than half of the students in the present study had positive attitudes toward the use of electronic tests. Similarly, previous studies showed that students had positive attitudes toward electronic tests (19,25-29). In addition, other studies showed that students had positive attitudes about the administration of electronic tests (2,27,30,31). Thus, the present study and the studies detailed above all have confirmed students' positive attitudes toward the administration of electronic tests.

Contradictory to these findings, Washburn et al reported that despite the advantages of electronic tests, students preferred to participate in conventional tests possibly due to unsuitable test administration, students' conflicting attitudes, or stress caused by electronic tests (32). Moreover, Hochlehnert et al showed that the majority of students agreed with the administration of conventional tests, which may be due to students' unfamiliarity with conducting electronic tests and the fear of making mistakes during the test due to technical problems (33).

The data in the present study also indicated that the students had moderately positive attitudes toward the five dimensions of electronic tests (the test structure and system, the fitness of the test with the teaching styles and the field of study, test security and stressors, solutions to improve electronic tests, and the comparison of electronic and paper and pencil tests). Concerning the structure of the testing system, a majority of students believed in the easy login to the electronic test system and easy administration of electronic tests. This finding can be attributed to the students' familiarity with how to use the testing system, the testing environment, and sample tests taken before administering the final test. Likewise, Ranjdoust showed that students were satisfied with the technical characteristics, test environment, and basic knowledge about technology in electronic tests, so they could easily log in to the electronic testing system and answer the test questions (34).

The students also confirmed the compatibility of electronic tests with the teaching style and their field of study and reported that electronic tests can be used for both mid-term and final exams. The students suggested that mid-term exams would help them review the materials covered during the semester and prevent rote learning. Mid-term exams also helped students to prepare for final exams (2).

The students in this study also complained about the lack of time for some computational questions on electronic tests. Concerning test security and its stressors, the students reported that they experienced a lot of stress on electronic tests as testees have a lot of time on paper and pencil tests compared to electronic tests and they have no control over it. In a similar vein, Piaw compared electronic and paper and pencil tests and suggested that electronic tests affect time and reduce it (35). To overcome this problem, the participants in this study suggested the inclusion of optional questions, the possibility of returning to answered questions, and highlighting unanswered questions and guessed answers on electronic tests.

Furthermore, technical problems make electronic tests problematic, perhaps due to inefficient systems and a lack

Table 3. The relationship between the students' overall attitudes toward electronic tests and their demographic variables

Variables	Categories	Mean ± SD	*P* value
Gender	Female	3.25 ± 0.710	0.839
	Male	3.26 ± 0.405	
GPA (out of 20)	<16	3.29 ± 0.516	0.376
	16-18	3.29 ± 0.491	
	>18	3.05 ± 0.304	
Academic program	Ph.D.	3.31 ± 0.776	0.407
	Master's program	3.59 ± 0.407	
	Bachelor's program	3.25 ± 0.495	
	Associate's program	2.77 ± 0.235	
Field of study	Nursing	3.21 ± 0.549	0.445
	Ph.D.	3.38 ± 0.691	
	Health engineering	3.24 ± 0.513	
	Paramedicine	3.33 ± 0.372	
Academic semester	Semesters 1 to 4	3.31 ± 0.510	0.961
	Semesters 4 to 11	3.23 ± 0.537	

of computer skills. In line with the findings of the present study, Faghihi et al reported additional sounds and sudden whistling of some computers and Washburn et al reported old and worn-out systems and the occurrence of some occasional systemic failures as some fundamental problem with administering electronic tests (31,32) that can be resolved to some extent by organizing technology training courses, developing facilities (the presence of additional computers in the exam hall/room), and the presence of IT experts in the exam hall/room.

The participants in this study also suggested that the inclusion of optional questions and the possibility of returning to answered questions could reduce students' anxiety and lead to a more effective evaluation of students. Accordingly, Yaşar Özden et al stated that if students can see the completed exam pages and make changes in the answers to the questions easily, it will reduce their anxiety and lead to a more efficient evaluation of students (20). However, a few students reported that the use of essay-type questions may lead to a better evaluation of students due to inadequate time and lack of concentration to answer these questions. Accordingly, an increase in test time for essay-type questions, assigning a rest time between questions, using a mouse and touch computer to increase concentration, and reducing the number of essay-type questions or replacing them with other questions can help to solve this problem.

Comparing paper and pencil and online tests, the students did not believe that easy scoring of online tests could be an important advantage of electronic tests. Accordingly, Faghihi et al and Rudland et al showed students believe that quick access to the exam answer sheet, the ability to quickly evaluate themselves, and giving feedback on the questions they objected to were some important advantages of electronic tests (31,36). Contrary to the present study, Habibi et al showed that students considered feedback and quick access to the answer sheet as stressful, which negatively affects their other exams if they do not receive the desired result (37).

The students in the present study suggested that electronic tests cause more stress in students than paper and pencil tests due to the use of computers, possibly because of the absence of training in electronic tests, conflicting attitudes of students, or stress caused by electronic tests. Thus, administering a pre-test before the main test can help students experience less stress on electronic tests. A majority of students in this study did not believe that response accuracy is higher in electronic tests than in paper and pencil tests. This finding can be attributed to the fact that students do not have control over the test time and cannot underline important points. Moreover, the noise caused by the buttons of the computer keyboard and mouse can distract students. Thus, using silent mice and computers with touch screens, holding pilot tests, and assigning a rest time between tests can help solve these problems.

Nevertheless, a majority of students in the present study believed that electronic tests are more cost-effective than conventional exams and that reducing printing, publishing, and distribution costs was one of the advantages of electronic tests. Similarly, Yazdani et al and Jouybari et al showed that the excessive use of paper and its production causes economic and environmental damage, and saving costs is one of the advantages of electronic tests (38,39).

Limitations

Despite its valuable insights about students' attitudes toward electronic tests, the present study was conducted with some limitations. First, the data in this study were collected using self-report instruments (questionnaires) that, compared to more reliable measurement methods, may not reveal the real perspective of the participants. Second, the instruments in this study were completed online and some participants did not complete all items. Third, access to all students was not possible. Thus, to overcome such problems, future studies need to investigate the role of educational infrastructure, including hardware facilities, in administering electronic tests. Furthermore, this study was conducted on students in one of the western cities of Iran, and its findings may not be generalizable to students in other geographical regions of Iran. Accordingly, other studies can examine the factors that facilitate the administration of electronic tests using larger samples from different parts of the country.

Conclusion

The present study indicated that more than half of the students had positive attitudes toward electronic tests and their five dimensions, especially the structure of the electronic testing system. If electronic tests are improved enough, they can be considered an innovation for learning and education. Through periodical evaluations, educational planners and managers can improve the quality and efficiency of electronic tests by enhancing their strengths and reducing or eliminating their weaknesses to foster their dynamism and more efficient administration in academic centers.

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Authors' Contribution

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Competing Interests

The authors reported no conflict of interest in this study.

Ethical Approval

The Ethics Committee of Ilam University of Medical Sciences approved the study (IR.MEDILAM.REC.1400.162).

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