ORIGINAL ARTICLE

Evaluation of Medical Students' Knowledge and Attitude toward Laparoscopic Surgeries

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Background: Nowadays, almost all abdominal surgeries, including those on the colon, rectum, stomach, liver, and pancreas, are performed laparoscopically. By recognizing the latest advancements in minimally invasive procedures, such as laparoscopy, and the absence of a dedicated training program in this area from our nation's medical curriculum, it is evident that assessing medical students' attitude and knowledge is crucial.

Method: In this cross-sectional study, 102 medical students from Islamic Azad University, Mashhad Medical Science Branch, in 2023-2024, were assessed using a questionnaire created by the researcher. The inclusion criteria were passing the internship or externship in 2023 and passing the surgery course during the externship. Incomplete questionnaire data served as an exclusion criterion. The questionnaire included 17 attitude questions (Likert scoring) and 14 knowledge questions (maximum score of 13). The questionnaire's validity and reliability were verified. The analysis was conducted using IBM SPSS version 26 software, with a significance level set at $p < 0.05$.

Results: Of the 102 students who participated in this study, 57 (55.9%) were externs. The mean age was 24.74 ± 2.48 years. Most of the participants were female (70.6%). The mean knowledge score was 9.77 ± 1.88, which signifies a commendable level of knowledge among participants. Furthermore, the attitude score was also assessed and found to be favorable. This study demonstrated that neither gender nor educational attainment had a statistically significant impact on the knowledge and attitude scores pertaining to laparoscopic surgery ($p > 0.05$).

Conclusion: Medical students recognize the importance and benefits of laparoscopic procedures; however, their knowledge and attitude toward this field need to be improved. Enhancing educational programs and providing hands-on learning opportunities will better prepare students to perform laparoscopic procedures effectively.

Keywords: Attitude, Knowledge, Laparoscopy, Medical Students

تقييم معرفة طلاب الطب ومواقفهم تجاه جراحات المناظير

الخلفية: تُجرى حاليًا جميع جراحات البطن تقريبًا، بما في ذلك جراحات القولون والمستقيم والمعدة والكبد والبنكرياس، بالمنظار. وبالنظر إلى أحدث التطورات في الإجراءات طفيفة التوغل، مثل تنظير البطن، وغياب برنامج تدريبي متخصص في هذا المجال من المناهج الطبية في بلادنا، يتضح أن تقييم سلوك طلاب الطب ومعرفتهم أمر بالغ الأهمية.

الطريقة: في هذه الدراسة المقطعية، تم تقييم ١٠٢ طالب طب من جامعة آزاد الإسلامية، فرع العلوم الطبية في مشهد، في الفترة ٢٠٢٣-٢٠٢٤، باستخدام استبيان أعده الباحث. وكانت معايير الإدراج هي اجتياز فترة التدريب الداخلي أو الخارجي في عام ٢٠٢٣ واجتياز دورة الجراحة أثناء فترة التدريب الخارجي. وشكلت بيانات الاستبيان غير المكتملة معيارًا للاستبعاد. وتضمن الاستبيان ١٧ سؤالًا عن السلوك (بمقياس ليكرت) و١٤ سؤالًا عن المعرفة (بحد أقصى ١٣ درجة). وتم التحقق من صحة الاستبيان وموثوقيته. أُجري التحليل باستخدام برنامج IBM SPSS الإصدار ٢٦، مع مستوى دلالة إحصائية عند $p < 0.05$.

النتائج: من بين ١٠٢ طالبًا شاركوا في هذه الدراسة، كان ٥٧ طالبًا (٥٥,٩٪) من الطلاب الخارجيين. كان متوسط العمر ٢٤,٧٤ ± ٢,٤٨ سنة. كانت معظم المشاركات من الإناث (٧٠,٦٪). بلغ متوسط درجة المعرفة ٩,٧٧ ± ١,٨٨، مما يدل على مستوى جيد من المعرفة بين المشاركات. علاوة على ذلك، تم تقييم درجة الموقف ووجد أنها إيجابية. أظهرت هذه الدراسة أنه لا يوجد تأثير ذو دلالة إحصائية لجنس الطالب أو التحصيل التعليمي على درجات المعرفة والموقف المتعلقة بجراحة المناظير ($p > 0.05$).

الخلاصة: يدرك طلاب الطب أهمية وفوائد إجراءات المناظير؛ ومع ذلك، فإن معرفتهم وموقفهم تجاه هذا المجال بحاجة إلى تحسين. إن تحسين البرامج التعليمية وتوفير فرص التعلم العملي من شأنه أن يُهيئ الطلاب بشكل أفضل لإجراء إجراءات المناظير بفعالية.

الكلمات المفتاحية: الموقف، المعرفة، تنظير البطن، طلاب الطب

لیپروسکوپک سرجریوں کی طرف میڈیکل طلبا کے علم اور رویہ کا اندازہ

پس منظر: آج کل، پیٹ کی تقریباً تمام سرجری، بشمول بڑی آنت، ملاشی، معدہ، جگر اور لبلبہ کی سرجری لیپروسکوپی طریقے سے کی جاتی ہیں۔ کم سے کم حملہ کرنے والے طریقہ کار، جیسے لیپروسکوپی، اور ہمارے ملک کے طبی نصاب میں اس شعبے میں کسی مخصوص تربیتی پروگرام کی عدم موجودگی کو تسلیم کرنے سے، یہ واضح ہوتا ہے کہ طبی طلباء کے رویے اور علم کا اندازہ لگانا بہت ضروری ہے۔

طریقہ: اس کراس سیکشنل اسٹڈی میں، ۲۰۲۳-۲۰۲۳ میں، اسلامی آزاد یونیورسٹی، مشہد میڈیکل سائنس برانچ کے ۱۰۲ میڈیکل طلباء کا تجزیہ کار کے تیار کردہ سوالنامے کا استعمال کرتے ہوئے جائزہ لیا گیا۔ شمولیت کا معیار ۲۰۲۳ میں انٹرن شپ یا ایکسٹرن شپ پاس کرنا اور ایکسٹرن شپ کے دوران سرجری کورس پاس کرنا تھا۔ نامکمل سوالنامے کے اعداد و شمار نے اخراج کے معیار کے طور پر کام کیا۔ سوالنامے میں ۱۷ رویہ کے سوالات (Likert اسکورنگ) اور ۱۳ علمی سوالات (زیادہ سے زیادہ اسکور ۱۳) شامل تھے۔ سوالنامے کی درستگی اور وشوسنیتا کی تصدیق کی گئی۔ تجزیہ IBM SPSS ورژن ۲۶ سافٹ ویئر کا استعمال کرتے ہوئے کیا گیا تھا، جس کی اہمیت کی سطح $p < 0.05$ پر رکھی گئی تھی۔

نتائج: اس مطالعہ میں حصہ لینے والے ۱۰۲ طلباء میں سے ۵۷ (۵۵,۹٪) خارجی تھے۔ اوسط عمر ۲۳,۶۳ ± ۲,۳۸ سال تھی۔ زیادہ تر شرکاء خواتین (۷۰,۶٪) تھیں۔ اوسط علم کا سکور ۹,۷۷ ± ۱,۸۸ تھا، جو شرکاء کے درمیان علم کی ایک قابل تعریف سطح کی نشاندہی کرتا ہے۔ مزید برآں، رویہ سکور کا بھی جائزہ لیا گیا اور اسے سازگار پایا گیا۔ اس مطالعے نے یہ ظاہر کیا کہ لیپروسکوپک سرجری ($p > 0.05$) سے متعلق علم اور رویہ کے اسکور پر نہ تو صنف اور نہ ہی تعلیمی حصول کا شماریاتی لحاظ سے کوئی خاص اثر پڑا۔

نتیجہ: میڈیکل طلباء لیپروسکوپک طریقہ کار کی اہمیت اور فوائد کو پہچانتے ہیں۔ تاہم، اس شعبے کے بارے میں ان کے علم اور رویہ کو بہتر بنانے کی ضرورت ہے۔ تعلیمی پروگراموں کو بڑھانا اور سیکھنے کے مواقع فراہم کرنا طلباء کو لیپروسکوپک طریقہ کار کو مؤثر طریقے سے انجام دینے کے لیے بہتر طور پر تیار کرے گا۔

کلیدی الفاظ: رویہ، علم، لیپروسکوپی، طبی طلباء

بررسی میزان آگاهی و نگرش دانشجویان پزشکی نسبت به جراحی های لاپاراسکوپی

زمینه و هدف: امروزه تقریباً تمامی جراحی های شکم از جمله جراحی های روده بزرگ، رکتوم، معده، کبد و پانکراس به روش لاپاراسکوپی انجام می شود با دانستن آخرین پیشرفت‌ها در روش‌های کم تهاجمی مانند لاپاراسکوپی و نبود برنامه آموزشی اختصاصی در این زمینه در برنامه درسی پزشکی کشور، ارزیابی نگرش و دانش دانشجویان پزشکی ضروری است.

روش: در این مطالعه مقطعی، ۱۰۲ دانشجوی پزشکی دانشگاه آزاد اسلامی واحد علوم پزشکی مشهد در سال تحصیلی ۱۴۰۲-۱۴۰۳ با استفاده از پرسشنامه‌ای محقق ساخته مورد ارزیابی قرار گرفتند معیارهای ورود به مطالعه گذراندن دوره کارآموزی یا کارورزی در سال ۱۴۰۲-۱۴۰۳ و گذراندن دوره جراحی در طول دوره کارآموزی بود. اطلاعات ناقص پرسشنامه به عنوان معیار خروج در نظر گرفته شد. پرسشنامه شامل ۱۷ سوال نگرش (امتیاز لیکرت) و ۱۴ سوال دانش (حداکثر نمره ۱۳) مورد ارزیابی قرار گرفتند روایی و پایایی پرسشنامه مورد تایید قرار گرفت. تجزیه و تحلیل با استفاده از نرم‌افزار IBM SPSS نسخه ۲۶ و با سطح معنی‌داری $p<0.05$ انجام شد.

یافته‌ها: ۵۷ نفر (۵۵/۹ درصد) از دانشجویان کارآموز بودند. میانگین سنی ۲/۴۸ ± ۲۴/۷۴ سال بود. اکثر شرکت کنندگان زن بودند (۷۰/۶درصد). میانگین نمره دانش ۱/۸۸ ± ۹/۷۷ بود که نشان دهنده سطح قابل توجهی از آگاهی در بین شرکت کنندگان بود. نمره نگرش نیز ارزیابی و مطلوب تشخیص داده شد. این مطالعه نشان داد که نه جنسیت و نه سطح تحصیلات، تأثیر آماری معنی‌داری بر نمرات دانش و نگرش مربوط به جراحی لاپاروسکوپی نداشتند ($p > 0.05$).

نتیجه گیری: دانشجویان پزشکی اهمیت و فواید روش‌های لاپاراسکوپی را می‌شناسند. با این حال، دانش و نگرش آنها در این زمینه نیاز به بهبود دارد. تقویت برنامه‌های آموزشی و ارائه فرصت‌های یادگیری عملی، دانشجویان را برای انجام مؤثر روش‌های لاپاراسکوپی آماده می‌کند

واژه های کلیدی: نگرش، آگاهی، لاپاراسکوپی، دانشجویان پزشکی

INTRODUCTION

Laparoscopic cholecystectomy began in Europe, with the first successful procedure performed by Philippe Mouret in 1987. The introduction of this technique marked a significant milestone in the treatment of gallstone disease, leading to the development of surgical methods that prioritize minimal access. This approach aims to minimize surgical trauma while ensuring adequate visibility of the surgical field (1). Today, laparoscopic surgery is utilized for nearly all types of abdominal surgery, including the colon, rectum, stomach, liver, and pancreas. Compared to open surgery, laparoscopic procedures result in less operative stress, leading to shorter hospital stays, quicker recovery times, and an improved quality of life for patients. Additionally, laparoscopy provides surgeons with enhanced visualization and magnification of anatomical structures and pathologies (2). This method has certain limitations, including the need for a longer practice time, the requirement of a unique set of skills, and the use of a video camera (2,3). Surgeons have historically been inclined to embrace innovations that build upon and thereby enhance their self-defined core skills (4).

During the last few decades, it has been firmly established that laparoscopic skills can be acquired outside the operating room (OR) using simulators. Training can be done on either virtual reality simulators (VRSs) or box trainers (BTs); both methods are effective for providing laparoscopic skills training (5). Given the growing use of minimally invasive procedures in many surgical subspecialties, medical students who are exposed to these procedures earlier may benefit more from their surgical rotations and be better able to determine whether a career in surgery is the right choice for them (4). In a study in Iran, before using educational booklets, students had little understanding of operating room equipment and the principles of laparoscopic surgery across all domains. However, using these booklets helped students become more knowledgeable about laparoscopic surgical care (5).

Due to the current advancement in minimally invasive surgeries, including laparoscopic surgeries, and the lack of a specific educational program in this field within medical education in the country, this study investigated the knowledge and attitudes of medical students toward laparoscopic surgeries.

METHODS

Study design and Participants

This cross-sectional study was conducted among 102 medical students at the Islamic Azad University, Mashhad medical science branch in 2023-2024. The study was conducted after approval from the ethics committee of the faculty of medicine (IR.MUMS.REC.1401.231). The inclusion criteria were completion of an internship or externship in 2023 and passing the surgery course during the externship. Incomplete questionnaire data served as an exclusion criterion.

Questionnaire

In this study, a researcher-made questionnaire was used. At first, after a comprehensive review of the articles, with the help of an expert panel (academic general surgeons), a primary draft of a questionnaire about the evaluation of medical students' knowledge and attitude towards laparoscopic surgery was designed with 14 four-option questions about knowledge and 17 five-option questions about attitude (Likert scoring). For the questions in the field of knowledge, each correct answer is given a score of one, and the wrong options are given a score of zero. To assess knowledge, a response rate of up to 50% is considered poor, 75% is considered average, and a rate of more than 75% is considered good. Responses to attitude questions were designed in the form of five-point Likert questions (strongly agree, agree, neutral, disagree, strongly disagree).

Content Validity

The validity of the questionnaire was confirmed through the content validity index (CVI) and content validity ratio (CVR) using the content validity confirmation method based on the ratios introduced by Lawshe for CVR (9). Questions with a CVR above 0.99 and a CVI index greater than 0.79, based on the opinions of 6 expert and academic general surgeons, were confirmed.

Reliability

The reliability of the questionnaire was assessed through the test-retest method. The questionnaire was distributed twice, two weeks apart, to 15 eligible participants in the study. Next, to determine the internal consistency of the items, Cronbach's alpha coefficient was calculated. According to the Cronbach's alpha coefficient of 0.70, all the questions were confirmed to be reliable. For the questions in the field of knowledge, each correct answer is given a score of one, and the wrong options are given a score of zero. A five-point Likert scale (from strongly agree to strongly disagree) was used to structure the questions assessing attitude.

Data Analysis

Quantitative variables were presented using mean and standard deviation, while qualitative variables were displayed as percentages. The normality of the data was assessed using the Kolmogorov-Smirnov one-sample test with Lilliefors correction. The independent-sample t-test was used to compare two groups of quantitative variables that have a normal distribution. The Pearson correlation test was utilized to explore linear relationships between

quantitative variables. The analysis was conducted using IBM SPSS version 26 software, with a significance level set at $p < 0.05$.

RESULTS

In this cross-sectional study, 102 medical students were included; among them, 72 (70.6%) were female. The mean age of the participants was 24.74 ± 2.48 years, and the mean study duration at their current academic level was 8.74 ± 4.17 months. There were 45 (44.1%) interns and 57 (54.9%) externs. Three of the students had prior medical-related education. Of the 79 respondents who reported prior experience with laparoscopic surgery, 32 had received direct theoretical training in the procedure (attending a laparoscopic surgery class or educational leaflet). Of the 80 students (78.4%) who witnessed laparoscopic surgery up close, 66 had gastrointestinal surgery, two urological surgery, nine gynecological surgery, and three other procedures. During their studies, eight students (7.8%) actively participated in surgery; four were involved in gastrointestinal surgery, one in urology, two in gynecology, and one in other procedures. Thirty-four respondents reported having undergone laparoscopic surgery for themselves or a family member; 26 of these cases involved gastrointestinal procedures, one involved a urological procedure, five involved gynecological procedures, and two involved miscellaneous situations.

Thirteen of the fourteen questions in the knowledge section of this survey were scientific evaluations, and one was a personal assessment of the participant's knowledge. A score was given for each correct answer, while no score was given for any incorrect answers. The lowest possible score was four, while the highest score was thirteen. In this study, the mean scientific evaluation score was 9.77 ± 1.88. Table 1 lists the domain-of-knowledge questions and the percentage of correct answers. Neither sex nor educational grade had a significant effect on the knowledge score regarding laparoscopic surgery (Table 2). Furthermore, the linear regression analysis examined the impact of gender and educational grade on knowledge scores about laparoscopic surgery, which was not statistically significant ($p > 0.05$).

Table 3 presents all 17 questions from the attitude section of the survey, along with the proportion of responses for each question. The analysis revealed no significant differences in students' attitude toward laparoscopic surgery based on gender or educational level for any of these questions ($p > 0.05$).

DISCUSSION

In this study, the mean knowledge score was 9.77 ± 1.88, indicating a good level of knowledge. The study showed that neither gender nor educational level had a statistically significant effect on the knowledge and attitude scores towards laparoscopic surgery.

Laparoscopic surgery has had a significant impact on all surgical disciplines and is now firmly embedded in routine surgical practice. It represents a new era of technology-dependent surgical interventions, and, to some extent, its future progress depends on the growth of interventional technologies and devices (facilitative, enabling, and additive) (6). The proper implementation of these operations needs specific information and skills that must be taught to students during their medical education. The connection between medical students' knowledge and positive attitude toward laparoscopic procedures stems from the fact that these students, as the future generation of physicians, will play a crucial role in improving the quality of medical services and patient treatment outcomes. As a result, investigating the level of knowledge and attitude of these students can help identify the strengths and weaknesses of medical education, as well as suggest recommendations for enhancing educational programs.

In 2008, Hotokzaka et al. conducted a study titled "Medical Students' Attitudes to Laparoscopic Surgery." Two hundred and seven medical students completed a questionnaire assessing their visualization of, knowledge about, and interest in observing laparoscopic surgery via a laparoscopic monitor (laparoscopic observation) and open surgery. Responses to each item were given as Likert-type scores ranging from 1 to 5. The results showed that laparoscopic surgery provides good visualization of the operative field. However, students' interest in laparoscopic surgery was similar to that of open surgery (7). Compared to the present study, the results were consistent in terms of strong comprehension and knowledge of laparoscopic procedures; however, they were not consistent in terms of most students' attitude and level of interest in laparoscopic surgeries.

Leitzke et al. conducted a study in Brazil in 2022 to measure medical students' laparoscopic skills. The study included 50 medical students in the 6th semester of a medical school in Brazil who answered 10 questions concerning their habits and traits. The surgical skills were assessed using a laparoscopic platform and an abdominal synthetic model, which consisted of three steps: passing the needle through the trocar and placing it in the laparoscopic needle holder, performing a simple stitch in the synthetic liver parenchyma, and tying a surgical knot. The duration of the activity was limited to four minutes, and a laparoscopic surgeon monitored the procedure. Only 18% of students were able to complete all three surgical stages, and no personal traits related to greater surgical skills were identified (8). In the present study, only 31.4%

Table 1. The frequency of responses to knowledge questions on laparoscopy in the subjects

Number	Question	Option 1 N (%)	Option 2 N (%)	Option 3 N (%)	Option 4 N (%)
1	Which of the following statements is true about laparoscopic surgery?	Laser-assisted surgery 2 (2)	Abdominal surgery without incision 5 (4.9)	**Minimally invasive surgery with small incisions 93 (91.2)**	Robot-assisted surgery 2 (2)
2	Which is correct about the complications of laparoscopic surgeries?	Laparoscopy is considered a surgery with minimal complications. 46(45.1)	Laparoscopy is a procedure that can lead to serious problems. 0 (0)	**Laparoscopy, like other surgeries, has complications. 56(54.9)**	Laparoscopy is a complication-free surgery. 0 (0)
3	Which of the following is accurate about laparoscopic surgery?	Laparoscopic surgery is performed as an outpatient procedure. 2 (2.0)	Laparoscopic surgery is performed on an outpatient basis but in the operating room. 5 (4.9)	**Laparoscopic surgery is not considered an outpatient surgery. 93 (91.2)**	Certain situations are handled as outpatients. 2 (2.0)
4	Is laparoscopic surgery more painful than open surgery?	Laparoscopic surgery is not painful at all. 4 (3.9)	Laparoscopic surgery is associated with a lot of pain. 0 (0)	**Laparoscopic surgery is less painful than open surgery. 89 (87.3)**	The pain of laparoscopic surgery is unpredictable. 9 (8.8)
5	How long is the hospital stay following laparoscopic surgery compared to open surgery?	Patients are discharged immediately after surgery. 2 (2.0)	Laparoscopic surgery requires a longer hospital stay than open surgery. 1 (1.0)	**Laparoscopic surgery has a shorter length of stay than open surgery. 97 (95.1)**	The length of stay for laparoscopic and open surgery is identical. 2 (2.0)
6	What is the purpose of laparoscopic surgeries?	Diagnostic 0 (0)	Therapeutic 1 (1.0)	Diagnostic-therapeutic 49 (48.0)	**Applicable independently for all options 52 (51.0)**
7	Which is correct about the duration of laparoscopic surgery?	Very long (more than three hours) 0 (0)	Very brief (less than half an hour) 1 (1.0)	**It varies depending on the type of surgery 85 (83.3)**	Shorter than open surgery 16 (15.7)
8	What sorts of operations may be performed laparoscopically?	Gastrointestinal surgery only 0 (0)	Urological surgery only 0 (0)	Gynecology surgery only 0 (0)	**Laparoscopy can be used for all abdominal surgeries 102 (100.0)**
9	Which option is correct in the case of pneumoperitoneum during laparoscopic surgery?	**In all laparoscopic surgeries, it is necessary to create a working space with laparoscopic instruments. 54 (52.9)**	Some laparoscopic procedures (but not all) require pneumoperitoneum. 12 (11.8)	Performing pneumoperitoneum depends on the surgeon's viewpoint and evaluation. 36 (35.3)	None 0 (0)
10	What gas is most commonly used for pneumoperitoneum?	**Co2 58 (56.9)**	N2O 21 (20.6)	O2 6 (5.9)	An equal combination of the above 17 (16.7)
11	Which option is correct regarding the pressure of the gas blown into the abdomen?	The gas pressure is increased until the surgeon has enough room to work in the abdominal cavity. 6 (5.9)	The gas pressure inside the abdomen is determined by the surgeon's experience and preference. 4 (3.9)	**The gas pressure inside the abdomen has a standard range and should not exceed it. 47 (46.1)**	Gas pressure inside the abdomen has a typical range, although it can be elevated under certain situations. 45 (44.1)
12	Which option is correct regarding metabolic changes during laparoscopic surgery?	Laparoscopy does not cause any metabolic changes. 0 (0)	These alterations, in most circumstances, result in major difficulties for the patient. 3 (2.9)	**In most circumstances, the body's compensatory mechanisms manage these alterations that happen during laparoscopy. 88 (86.3)**	These alterations occur during laparoscopic surgery but do not lead to any consequences. 11 (10.8)
13	What is the most critical problem confronting laparoscopic surgery that makes this operation technically difficult?	Emergency conditions and diseases such as acute cholecystitis and acute appendicitis 4 (3.9)	**Previous open procedures and intra-abdominal adhesions 83 (81.4)**	Chronic underlying diseases such as diabetes and hypertension 9 (8.8)	Taking medications such as aspirin and Plavix 6 (5.9)

In each question, the correct option is highlighted in bold.

Table 2. Distribution of knowledge score about laparoscopic surgery by sex and educational grade

Variable	Minimum	Maximum	Mean (SD)	p-value
Male (30 People)	4	13	9.66 (2.07)	0.711
Female (72 People)	5	13	9.8 (1.81)	
Externs (57 People)	5	13	9.54 (1.61)	0.165
Interns (45 People)	4	13	10.06 (2.15)	

Table 3. Distribution of the frequency of responses to attitude questions about laparoscopy

Number	Question	Strongly agree N (%)	Agree N (%)	Neutral N (%)	Disagree N (%)	Strongly disagree N (%)
1	I believe laparoscopic surgery is advantageous for patients.	39 (38.2)	58 (56.9)	3 (2.9)	4 (2)	0 (0)
2	I believe laparoscopic surgery is more difficult than open surgery.	4 (3.9)	39 (38.2)	22 (21.6)	32 (31.4)	5 (4.9)
3	I believe laparoscopic surgery requires more skill than open surgery.	28 (27.5)	56 (54.9)	12 (11.8)	4 (3.9)	4 (2)
4	I believe that laparoscopic surgery is a safe and low-complication type of surgery for numerous diseases.	15 (14.7)	74 (72.5)	9 (8.8)	3 (2.9)	1 (1.0)
5	I believe that if the patient meets the standard criteria for laparoscopic surgery, it would be appropriate for him to be evaluated and operated on by a laparoscopic surgeon.	46 (45.1)	49 (48.0)	7 (6.9)	0 (0)	0 (0)
6	I believe that patients with inguinal hernias should be encouraged and recommended for laparoscopic surgery.	13 (12.7)	37 (36.3)	33 (32.4)	18 (17.6)	1 (1.0)
7	I believe a patient with an incision hernia (hernia of the previous open surgical site) should be encouraged and referred for laparoscopic surgery.	6 (5.9)	23 (22.5)	39 (38.2)	28 (27.5)	6 (5.9)
8	I believe that patients with symptomatic gallstones would be better encouraged and directed for laparoscopic surgery.	36 (35.3)	52 (51.0)	7 (6.9)	4 (3.9)	3 (2.9)
9	I believe that a patient with morbid obesity should be sent to a laparoscopic surgeon for consultation and bariatric surgery.	47 (46.1)	23 (22.5)	20 (19.6)	10 (9.8)	2 (2.0)
10	I believe a patient with colon cancer is better referred for consultation and a laparoscopic colectomy.	10 (9.8)	37 (36.3)	28 (27.5)	23 (22.5)	4 (3.9)
11	I believe a patient with vaginal bleeding who is a candidate for hysterectomy should be referred for consultation and laparoscopic hysterectomy.	15 (14.7)	45 (44.1)	29 (28.4)	13 (12.7)	0 (0)
12	I believe that a nephrectomy candidate should be sent to a laparoscopic procedure for consultation and nephrectomy.	10 (9.8)	45 (44.1)	35 (34.3)	12 (11.8)	0 (0)
13	I believe a 75-year-old man with a history of cardiopulmonary issues, tobacco use, and uncontrolled diabetes is suitable for laparoscopic surgery.	6 (5.9)	23 (22.5)	37 (36.3)	32 (31.4)	4 (3.9)
14	Given the community's recognition of laparoscopic surgery, medical graduates need to know the basics.	45 (44.1)	51 (50.0)	4 (3.9)	2 (2.0)	0 (0)
15	Including laparoscopic surgery in the general surgery curriculum is beneficial.	26 (25.5)	53 (52.0)	12 (11/8)	7 (6.9)	4 (3.9)
16	The academic instruction on laparoscopic surgery is appropriate and sufficient.	12 (11.8)	34 (33.3)	26 (25.5)	26 (25.5)	4 (3.9)
17	I prefer laparoscopic surgery to open surgery in similar operations.	35 (34.3)	57 (55.9)	7 (6.9)	2 (2.0)	1 (1.0)

of the students had received training in laparoscopic surgery, and only 7.8% of the study group performed laparoscopic surgery directly. However, 77.5% of participants expressed a need for a laparoscopic surgical training course in general medicine, which is consistent with the findings of the above study.

In a 2018 study conducted by Sedigheh Hanani et al., on the effect of using the booklet "Fundamentals of Laparoscopic Surgery" on upgrading the knowledge of operating room technology students in laparoscopic surgery care domains at Iran University of Medical Sciences, 28 students in the 8th semester were enrolled. In this study, the knowledge of students before and after (interval 30 days) instruction in Fundamentals of Laparoscopic Surgery was assessed utilizing a researcher-made questionnaire. Following the instruction, students' knowledge prior to, during, and after surgical care improved significantly. The author concluded that students' knowledge of operating room technology, particularly the fundamentals of laparoscopic surgery, in all domains was low before using the educational brochure. The use of the educational booklet resulted in increased student knowledge in the fields of laparoscopic surgical care, it is recommended that it be used in the education program of operating room technology student (5). In the current study, 80.4% of students believed their knowledge of laparoscopic surgeries to be insufficient, a finding consistent with the results of previous studies.

In 2024, Chen et al. conducted a study titled “Laparoscopic Training Workshop to assess medical students' skill acquisition and interest in surgical careers”. This prospective experimental study was conducted at E-Da Hospital in Kaohsiung City, Taiwan, involving 44 medical students. A questionnaire was used in this study to assess the impact of education on students' interest in surgery as a career. The results showed that the laparoscopic workshop significantly improved technical capabilities and had a positive effect on students' career aspirations in surgery. Besides, the hands-on experience provided by such workshops not only bolsters skill acquisition but can also play a pivotal role in shaping the career trajectories of emerging medical professionals (9). In our study, there was no significant relationship between students' knowledge level, attitude, and educational level, which could be due to the lack of a focused academic program on laparoscopic procedures in our educational program. The availability of a training program can enhance technical skills and knowledge levels, according to studies such as the one mentioned above.

The study has two notable weaknesses: the use of cross-sectional data and its limited focus on the Islamic Azad University, Mashhad Medical Sciences Branch. It is recommended that future research involve a larger sample size and include students from other universities. Additionally, future studies should investigate the effectiveness of training in laparoscopic surgeries and compare medical students' attitude and knowledge regarding laparoscopic techniques with those related to traditional surgical methods.

CONCLUSION

The current study found that medical students' knowledge and attitude regarding laparoscopic operations are satisfactory, but there is room for improvement. Most students are aware of the benefits of these operations, including shorter recovery times and reduced postoperative discomfort. Some general medical students, however, are worried about the dearth of training in this field. It is recommended that medical education programs incorporate both theoretical and practical training courses on laparoscopic procedures to enhance students' knowledge levels and foster a more positive attitude. Ultimately, these actions can raise the healthcare standards by precisely and quickly referring patients who are suitable candidates for laparoscopy.

Ethical Considerations:

Ethical issues including plagiarism, informed consent, misconduct, data fabrication and/or falsification, double publication and/or submission, redundancy, etc. have been completely observed by the authors.

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