

# Effectiveness of Journal Club Presentation as a Learning Modality in the Endocrinology and Endocrine Surgery Module in an Integrative Undergraduate Medical Curriculum

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**Introduction:** The journal club is widely used in most postgraduate programs of medical institutes; however, the use of journal clubs in undergraduate medical programs is nearly absent or very rare.

**Aim:** The aim of this work is to document the insertion of the journal club as a method for learning in the undergraduate starting with the endocrinology/endocrine surgery module to be fully implemented in all modules of the MBBS of FMBU. In addition, the study aimed to outline the steps of designing a journal club by following specific procedures and Identification of students' and faculty satisfaction through 5-years implementation of the journal club.

**Material and Methods:** A total of 453 students representing the five consecutive batches of medical students from 2019 to 2023 who studied the endocrinology/endocrine surgery module were entered into the study. Following guidelines for implementation of the journal clubs that were adopted by the quality and accreditation committee, the faculty select the types of papers from the articles chosen by students. The papers discussed were case reports, original research, and review articles. The students were asked to formulate critical appraisal topics, PICO, for each paper. A 20-question test was applied to all participants. The students' attendance, scores, and students/faculty satisfaction were estimated.

**Results:** A total of 50 papers were discussed in the 5-year journal club 15 case reports (30%), 26 original research (52%), and 9 review articles (18%). The student's attendance ranged from 72.53±3.74 to 98.07±3.15. The students and faculty's satisfaction were 3.52 and 3.82 respectively. The mean Students' score in A 20-question test in a 5-year journal club was 76.93 ± 9.78 and the lowest score was in the 2nd batch (online batch).

**Conclusion:** The insertion of a well-structured journal club in the undergraduate medical program is necessary to improve the knowledge including knowledge among students. In addition, journal clubs inspire students to be lifelong learners.

**Keywords:** curriculum, critically appraisal skills, integrated program, journal club, PICO

## Introduction

Faculty of Medicine, Al-Baha University (FMBU) follows the integrative approach of teaching in the medical Bachelor of Medicine, Bachelor of Surgery program (MBBS) program.<sup>1,2</sup> The integration was adopted not only in the basic and preclinical years but also in the clinical years.<sup>3,4</sup> Therefore, many learning and teaching strategies were adopted such.<sup>4-6</sup> The introduction of a journal club in the undergraduate medical program is an innovative learning tool as most journal clubs are applied to the postgraduate programs in most institutes.

A journal club is simply defined as a regular devoted meeting where healthcare practitioners gather to converse about different types of published articles from indexed peer-reviewed journals.<sup>7</sup> These regular meetings have many advantages such as helping healthcare providers as fellows and residents to be in contact with recent research updates, promoting and alleviating their critical thinking skills, and enhancing their presentation and arguing abilities. A journal club is

considered a fundamental element in the training program for internship, residency, and fellowship in virtually all medical and healthcare provider institutes.<sup>8–10</sup>

Deenadayalan et al suggested some features for journal clubs to be effective that include encompassed even and anticipated meetings, mandatory attendance, strong and well-structured objectives, proper meeting timing and motivations, a well-trained journal club leader to select papers and lead conversation, distributing papers previous to the onset of the meeting, availability of the internet for broader distribution and information storing, application of recognized critical appraisal procedures and succinct journal club conclusions.<sup>11</sup>

Many forms of journal clubs have been developed over the years. The most identified formats include a traditional format and an evidence-based format.<sup>12,13</sup> The traditional format describes one presenter portraying formerly selected articles, and the attendees discuss and debate the results and findings followed by comments from the senior faculty founded on their experience. The evidence-based journal club is suitable for solving clinical queries, debates, and questions evolving from clinical situations. The discussions comprise the critical assessment of methodological views and whether the results would alter the clinical practice.<sup>14–16</sup> An additional forms of journal club are the online type,<sup>17–19</sup> and flipped journal club. These formats join large groups, keeps learners responsible, and pushes greater participation among learners and faculty.<sup>20,21</sup>

After assessment of the current situation, the program committee found that the ratio of student-centered learning is low compared to the internal benchmark ratio and suggested some learning modalities to be newly introduced. The program committee in association with quality and accreditation unit decided to introduce the journal club in the curriculum starting with the endocrinology module. Many challenges were faced such as it is the first time to use this learning tool in the undergraduate integrative curriculum, how to select the topics and how to prepare the faculty in performing the journal club ideally.

The aim of this work is to document the insertion of the journal club as a method for learning in the undergraduate medical curriculum starting with the endocrinology/endocrine surgery module to be fully implemented in all modules of the MBBS of FMBU. In addition, the study aimed to outline the steps of designing a journal club by following specific procedures adopted by the quality and accreditation committee and finally, identifying student and faculty satisfaction through the 5-year implementation of the journal club.

## Materials and Methods

This article is approved by the Scientific Research Ethical Committee of Al-Baha University-Faculty of Medicine (SRECFM-BU) under REC/PEA/BU-FM/2023/71. This study is a retrospective study in which a total of 453 students in the fourth academic year studied the endocrine/endocrine surgery module. These students were representing the 5 batches of the successive 5 years starting from 2019 to 2023. All students registered in the endocrinology/endocrine surgery module were entered in the study including male and female sections. A variety of teaching and learning tools were adopted in the endocrinology module besides the journal club. The evidence-based, and online journal clubs (during the Covid-19 pandemic) were introduced. Four journal clubs were implemented in the endocrinology module each year. In each academic year, the students were oriented about the importance of journal clubs as a student, learner, doctor, professional and scholar. In addition, the students were educated about the steps of journal clubs and optimal requirements that should the students prepare for it. The students were subdivided into main 4 groups: 22–24 students per each, which was further subdivided into small subgroups ranging from 5 to 8 students. The students in each subgroup were asked to search for special papers, either case studies, original articles, or review articles that serve in achieving the learning outcomes of the module. From the obtained articles, two papers were selected by the module committee for each group and the total number of papers discussed in each batch was about 10. Each group was responsible for preparing and introducing the journal club as a Ppt presentation. Each session has 2–3 assessors using a checklist for evaluation. Before starting the module activities, orientation about the preparation and judgment of a journal club was introduced and a handout was distributed containing the instructions and procedures for implementing a journal club. The students should follow the procedures for the journal club which were adopted by the quality/accreditation unit. These procedures consisted of 11 steps as follows:

## Describe the Major Interest That is Involved in This Article

The students were starting the presentation with a brief case presentation, or briefly clarifying how the article is appropriate to applied learning outcomes. This helps attendees to be more fully participant in the presentation and attracts them to the end of the story.

## Explain How the Participants Came Across This Article

For more benefit and student training, the presenter must explain the strategy of searching to catch this specific article such as using keywords, using a mesh of PubMed/Medline, Scopus, and others. In addition, describe how many articles he found dealing with and close to this subject.

## Brief Description or Introduction of the Study

The presenter should describe in brief the study and its type such as cross-sectional, descriptive, prospective, retrospective, cohort, case study, case series, randomized, controlled trial of therapy. Furthermore, the presenter should describe whether the study is diagnostic, therapeutic, or prognostic. In addition, the presenter should illustrate the site of conducting the research.

In a case presentation, the presenter should start with some universal forms of the patient followed by the chief complaint.

## The Presenter Should Illustrate the Research Question

Richardson et al illustrated the main basic components of the research question and the presenter should answer all these components: these include the population studied, exposure or intervention including therapy, tests, risk factors, and others, comparison, or control (alternatives to exposure or intervention) and outcomes.<sup>22</sup>

## Brief Description of the Importance, and Setting of This Question

This data is mainly found in the introduction of an article where the author places the current study in the setting of other literature and stresses the importance of the current study.

## Describe the Methods by Giving More Detail on the Question Components Either Critical Appraised Topics (CAT) or PICO Format Questions

Following this succinct introduction, more details on the Patients (as the number, age, sex, and others), Intervention or exposure, Comparison with others, and Outcome and fate (PICO) related to the research question should be given.<sup>23</sup>

## Respond to the Criticism and Critically Appraised Topics (CAT) About Study Validity

The presenter should briefly respond to the assumed critical appraisal questions on the validity. The idea is how to translate clinical research into evidence-based decisions to improve patient care.<sup>24</sup>

## Summarize the Obtained Results

The presenter can report the results after the research question. The summary of the obtained results should be focused mainly on the primary question and just present the secondary results if they are appropriate and relevant.

## Explain the Ability to the Application of These Results to the Current Case or Patient

The presenter can assess the study's validity by the ability to apply these results to the presenting case. This is determined by making a comparison between the presenting case and the presented study according to similarities and differences.

## Conclude with the Final Decision About the Effectiveness of the Study in Clinical Practice

The presenter can do a brief short summary of the case and in one statement can end the question by deciding the utilization of the results in the current case.

## A Succinct Handout Summarizing the Article Should Be Prepared

The summary will serve as notes for the presentation and will guide the group's attention.

Following these steps, both the presentation and critical appraisal skills of the students will be enhanced.

At the end of each journal club session, the students' satisfaction was evaluated using a Likert scale questionnaire ranging from 5 to 1: highly satisfied to highly dissatisfied. In addition, the evaluation of the level of satisfaction among the assessors and supervisors, and attendant faculty was done using the same instrument as the Likert scale questionnaire.

Several variables were measured including the students' attendance, students' achievement, and students/faculty' satisfaction.

## Statistical Analysis

Descriptive and parametric tests such as Analysis of Variance (ANOVA) were used in the study. The result is significant at  $p < 0.05$ . SPSS version 17 was used in the current study.

## Results

The study was designed to estimate the effectiveness of journal clubs among medical students. The study was carried out on 453 medical students of the endocrinology and endocrine surgery module representing the five batches starting from 2019 to 2023. A total of 75 papers were obtained by students, and only 50 papers were selected and discussed in the 5-year journal club. These papers included case reports, original research, and review articles. Following the steps adopted by quality accreditation committee in collaboration with the module committee of FMBU, CAT and PICO format were done by students in each journal club session. Examples of CAT and PICO formats formulated by students are represented in Table 1 (Table 1).

The papers discussed in the 5-year journal clubs included 15 case reports/studies (30%), 26 original research (52%) and 9 review articles (18%). More details about types of paper in each batch are presented in Table 2 (Table 2). Variable measures are estimated including attendance, students' scores, and students/faculty' satisfaction in the current study.

In general, students' attendance was good for all the 5-year journal club with the exception for the 2nd batch which was related to Covid-19 pandemic. The attendance ranged from 68.1% to 100%. The lowest attendance was recorded during Covid-19 pandemic in which the attendance was obtained from data of allocated special system in our institute

**Table 1** Shows Examples of Selected CAT and PICO Formats Prepared by Students in the Journal Club

Article	CAT Study Question	PICO Format Question	Patient, Problem	Intervention	Comparison Intervention	Outcome
<b>Original research</b> (Metabolic Dyslipidemia and Cardiovascular Outcomes in Type 2 Diabetes Mellitus: Findings from the Look AHEAD Study) <sup>25</sup>	Whether diabetes mellitus type 2-related abnormalities in the triglyceride-HDL-C profile associated with cardiovascular disease (CVD) risk?	In type 2 Diabetes, are abnormalities of triglycerides- HDL-C associated with cardiovascular disease (CVD) risk?	Diabetic patient with hyperlipidemia	Analysis of HDL-C	CVD	The necessary justification for metabolic dyslipidemia in CVD risk delamination among T2DM.

(Continued)

Table 1 (Continued).

Article	CAT Study Question	PICO Format Question	Patient, Problem	Intervention	Comparison Intervention	Outcome
<b>Review article</b> (Recent Trends in Therapeutic Approaches for Diabetes Management: A Comprehensive Update) <sup>26</sup>	Whether new methods for the management of diabetes as stem cell therapy, gene therapy, or pancreatic transplantation or new drug therapy as leptin control diabetes as well as insulin and other traditional drugs?	Are new methods for the management of diabetes as stem cell therapy, gene therapy, or pancreatic transplantation or new drug therapy as leptin equivalent to Traditional drugs in the management of diabetes?	Diabetic patients	Stem cell/gene therapy, natural plants, pancreatic transplantation, new drugs	Traditional drugs/ insulin	Equivocal results, still need further analysis and research
<b>Case report</b> (Familial Glucocorticoid Deficiency Presenting with Tonic-Clonic Seizure: A Case Report) <sup>27</sup>	Whether familial glucocorticoid deficiency (FGD) has unusual presentation other than the classic presentation?	Are there any unusual presentation for FGD rather than the classic form?	FGD patient type 4 (NNT mutation)	Unusual presentation and new genetic findings	Classic presentation	More research should be conducted to detect other associations with FGD type 4.

**Table 2** Shows the Number and Type of Articles Selected (Case Report, Original Research, and Review Article) for Each Batch in the 5-Year Journal Club

Batch	Numbers and Types of the Papers			Total
	Case Study	Original Research	Review Article	
1st batch	2	6	2	10
2nd batch (online)	3	5	2	10
3rd batch	4	4	2	10
4th batch	3	6	1	10
5th batch	3	5	2	10
Total	15 (30%)	26 (52%)	9 (18%)	50

(RAFID). The low attendance during pandemic was due to multiple factors including reported cases among students and their families, weak internet, and inappropriate timing, loss of interest among some students and social factors. More details of the students' attendance are represented in Table 3 including mean  $\pm$  SD for each batch (Table 3).

Regarding students' scores, the mean score for all batches was  $76.93 \pm 9.78$ . The 2nd batch revealed the lowest mean among all batches. Pairwise comparison revealed significant differences between the 2nd batch vs 1st batch ( $p = 0.00437$ ), 2nd batch vs 4th batch ( $p = 0.00132$ ), and 3rd batch vs. 5th batch ( $p = 0.00215$ ). However, no significant differences were obtained between other batches. In addition, a significant difference was obtained on comparison of all batches ( $p = 0.00034$ ). More details are presented in Table 4 (Table 4).

Regarding students' satisfactions, pairwise comparison between the students' satisfaction revealed that there are significant differences between 1st batch vs the 2nd batch ( $p = 0.0001$ ), between 2nd batch vs 3rd batch ( $p = 0.0000$ ), 2nd

**Table 3** Shows the Students' Attendance in the Journal Clubs in Each Batch of the 5-Year Journal Club

	Registered Students	1st Session	2nd Session	3rd Session	4th Session	Mean $\pm$ SD
1st batch	88	82 (93.2%)	85 (96.6%)	84 (95.5%)	86 (97.8%)	95.8 $\pm$ 1.95
2nd batch (online)	91	65 (71.4%)	62 (68.1)	70 (77%)	67 (73.6%)	72.53 $\pm$ 3.74
3rd batch	93	90 (96.8%)	91 (97.8%)	89 (95.7%)	88 (94.6%)	96.2 $\pm$ 1.38
4th batch	90	88 (97.8%)	87 (96.7%)	88 (97.8%)	88 (97.8%)	97.5 $\pm$ 0.55
5th batch	91	85 (93.4%)	90 (98.9%)	91 (100%)	91 (100%)	98.07 $\pm$ 3.15
Total	453					

**Table 4** Shows the Students' Scores in the 20-Question Test Applied for Topics Learned by Journal Clubs for Each Batch in the 5-Year Journal Club

Batch	Students' Scores (Number and %)					Mean $\pm$ SD	Total Participants	P value
	$\geq 90$	80–89%	70–79%	60–69%	$< 60\%$			
1st batch	8	36	35	5	4	78.2 $\pm$ 9.97	88	0.00034
2nd batch (online)	2	16	52	15	6	73.18 $\pm$ 9.97	91	
3rd batch	5	34	35	11	8	76.19 $\pm$ 10.9	93	
4th batch	7	39	33	7	4	78.66 $\pm$ 9.69	90	
5th batch	5	37	38	6	5	78.48 $\pm$ 9.25	91	
Total	27	162	193	44	27	76.93 $\pm$ 9.78	453	

**Table 5** Shows the Students' Satisfaction with the Journal Clubs for Each Batch in the 5-Year Journal Club

Batch	Degree of Students' Satisfaction (Number & %)					Total Likert Points and Mean	Total Participants	ANOVA Test
	Strongly Satisfied (5)	Satisfied (4)	Neutral (3)	Dissatisfied (2)	Strongly dissatisfied (1)			
1st batch	24 (120)	32 (128)	10 (30)	15 (30)	7	315 (3.58)	88	P value 0.0001
2nd batch (online)	12 (60)	16 (64)	11 (33)	34 (68)	20	245 (2.63)	93	
3rd batch	32 (160)	40 (160)	7 (21)	9 (18)	3	362 (3.98)	91	
4th batch	32 (160)	24 (96)	12 (36)	17 (34)	5	331 (3.68)	90	
5th batch	29 (145)	38 (152)	3 (9)	14 (28)	7	341 (3.75)	91	
Total	129 (645)	150 (600)	43 (129)	89 (178)	42	1594 (3.52)	453	

vs 4th batch ( $p = 0.0000$ ), and 2nd vs 5th batch ( $p = 0.0000$ ). In addition, there is a significant difference among all batches ( $p = 0.0001$ ). However, no significant differences between other groups were obtained. More details are presented in Table 4 (Table 5).

Regarding faculty's satisfaction, pairwise comparison between the faculty's satisfaction revealed that there are significant differences between 1st batch vs the 2nd batch ( $p = 0.00259$ ), between 2nd batch vs 3rd batch ( $p = 0.00353$ ), 2nd vs 4th batch ( $p = 0.00005$ ), and 2nd vs 5th batch ( $p = 0.00002$ ). In addition, there is a significant difference among all batches ( $p = 0.0001$ ). However, no significant differences between other groups were obtained. All these data are shown in Table 5 (Table 6). No significant results were obtained between satisfactions and the type of paper. The questionnaire instrument used in this study is presented in table (Table 7).

**Table 6** Shows the Faculty's Satisfaction with the Journal Clubs for Each Batch in the 5-Year Journal Club

Batch	Degree of Faculty' Satisfaction (Number & %)					Total Likert Points, Mean	Total	P value
	Strongly Satisfied	Satisfied	Neutral	Dissatisfied	Strongly Dissatisfied			
1st batch	10 (50)	8 (32)	2 (6)	2 (4)	2	94 (3.92)	24	0.0001
2nd batch (online)	3 (15)	5 (20)	3 (9)	10 (20)	7	71 (2.54)	28	
3rd batch	12 (60)	7 (28)	1 (3)	4 (8)	2	101 (3.88)	26	
4th batch	13 (65)	8 (32)	1 (3)	1 (2)	1	103 (4.29)	24	
5th batch	17 (85)	3 (12)	1 (3)	2 (4)	1	105 (4.38)	24	
Total	55 (275)	31 (124)	8 (24)	19 (38)	13	3.81	126	

**Table 7** Questionnaire Used in the Present Study to Illustrate the Satisfactions of Both Students and Faculty Members

	Item	Strongly Satisfied	Satisfied	Neutral	Dissatisfied	Strongly Dissatisfied
1.	I suppose Journal club activities are an effective method to learning.					
2.	I appreciate Journal club as dynamic learning activities.					
3.	I learn well in a team based active situation.					
4.	I have a distinct impression of the direction of Journal club activities.					
5.	I recall the knowledge in Journal club longer than other learning tools.					
6.	Journal club activities encourage me to be more cooperative than other student-centered activities.					
7.	I think that Journal club promotes deep thinking more than superficial thinking.					
8.	The steps of Journal club helped me to identify the gap of knowledge.					
9.	Variety of the selected papers helped me in understanding the different types of research principles as type of study either interventional, cohort, retrospective, others					
10.	Journal club helped me in understanding the basis of evidence-based medicine					

(Continued)



**Table 7** (Continued).

	Item	Strongly Satisfied	Satisfied	Neutral	Dissatisfied	Strongly Dissatisfied
11.	Journal club motivates the acquisition of knowledge and skills among teams.					
12.	Journal club creates a state of prioritization in thinking.					
13.	I think Journal club assisted me to advance my value.					
14.	Journal club activities help me to critically appraise the paper					
15.	Journal club activities helped to tabulate the PICO format					
16.	The questions that were in the test paper that emerged from the topics that I studied in Journal club were interesting and I dealt with them with ease.					
17.	Journal club helped me a lot in improving my module score and accordingly my academic GPA increased.					

## Discussion

Medical students and health professionals need to acquire the necessary skills to be life-long learners and practice evidence-based medicine. Some recommended skills should be learned to achieve these goals such as the ability to formulate a question, perform systematic searches of the literature, critically appraise articles, and formulate their own conclusion and experience following allocating the evidence.<sup>28</sup> All these skills will be achieved through well-designed journal club.<sup>29–32</sup>

In the present work, the attendance of students ranged from 68.1% to 100%. However, the lowest attendance was observed in online sessions during the Covid-19 pandemic. These low student attendances are associated with low student scores. This observation is compatible with that observed in McLeod et al study.<sup>33</sup> McLeod compared 2 types of journal clubs: online versus traditional journal clubs regulated by faculty. They revealed that the attendance rate for online journal clubs was 18% compared to 96% for the traditional format. Furthermore, the mean scores of participants in the online group were significantly lower compared to that in traditional journal clubs.

The present study revealed that the level of student satisfaction with the journal club in the endocrinology module in all 5 successive academic years was 92% (satisfied 30%, highly satisfied 62%). This result is compatible with many studies<sup>31,32,34</sup> in which the percentage of satisfied to highly satisfied ranged from 31% to 55%, however, these studies were carried out on the residents, not on undergraduates. No studies were done to estimate the level of satisfaction among undergraduates. This may be due to the inadequate representation of the journal club in most integrative undergraduate medical programs, or the journal club is not considered one of the learning tools in most of the undergraduate curricula.

In addition, the identification of satisfaction is recommended by Taverna et al<sup>35</sup> who stated that journal club experiences are greatly valued by applicants and trainees and could be a beneficial selection for the training of convinced soft skills.

The students' satisfaction regarding types of journal clubs (traditional, or online) revealed that the students' satisfaction was higher in traditional classes than in online or virtual classes with significant differences. In addition, the student's attendance was low in virtual classes compared to that of traditional classes with significant differences. This coincides with the study of McLeod et al<sup>33</sup> on a randomized controlled experiment in which participants were grouped in a random fashion into a traditional journal club and a virtual journal club. The involvement in the virtual journal club was observed to be inadequate even though it was a general elective learning requirement for those residents. In addition, the participants of the traditional class attained significantly higher scores in the validated critical appraisal



test. However, Hammond and Whelan<sup>34</sup> revealed that participation in an online journal club showed a higher degree of satisfaction than in a traditional format.

In the present study, no significant results were obtained between satisfactions and type of paper. This coincides with McLeod study<sup>33</sup> which no significant differences were observed among participants. However, students' satisfaction was reported to be higher in articles covering both professional and socioeconomic aspects, and effective instruments for teaching all domains as well as critical appraisal skills and advancing reading habits.<sup>34,36,37</sup>

In the present study, the 4 sessions of journal club in the short endocrinology module revealed that the student acquired knowledge and skills despite the time of the module being short. This is compatible with short courses of other studies.<sup>38–40</sup> So, this indicates that short courses including journal clubs are valuable in improving knowledge and skills among the participants.<sup>29,41</sup>

In addition, this result is compatible with the study of Cheatham<sup>38</sup> about the effectiveness of a one-year journal club curriculum in general surgery and revealed improvement in knowledge, test scores, and achievement of learning outcomes at the end of the curriculum. In addition, Lee et al<sup>42</sup> revealed the effectiveness of the short course journal club in ophthalmology using critique checklist and found that about 86% of residents showed improvements in various skills.

Regarding journal club and knowledge acquisition, the obtained results revealed that most of the students attained high scores on the 20-question test applied to topics learned by the journal club. This is matched with the results of Hammond and Whelan<sup>34</sup> who revealed that the participating residents in the journal club achieved good scores in the educational program. However, there is no evidence that supports the keeping of knowledge retention for a long period as most evaluating processes occur at the end of the curriculum.<sup>31,32</sup>

In addition, Thurnau and Fishburne<sup>43</sup> described a regular journal club in an obstetrics and gynecology program. The goals of the journal club were to induce and foster critical thinking about medical reports, deliberate experimental design, and attain knowledge of current literature. The outcome was that all participating residents assessed and critiqued 119 medical articles, designed 42 study proposals, and published 12 papers. The knowledge and skills acquisitions were of utmost high, and all participating residents revealed high achievement.

Lee et al<sup>44</sup> confirmed that the journal club is considered an effective tool for evaluating and supporting teaching, particularly practice-based medicine and it has a major role in improving the educational outcomes.

In the current study, critical appraisal training (CAT) was a part of the objectives of the journal club. This coincides with many studies.<sup>29,30,33</sup> Other studies designed critique checklists to judge the quality of the papers.<sup>32,44</sup>

In the present study, two papers were discussed in each journal club session that have been selected by students and the faculty did selection from the chosen papers, this coincides with many reports, in which 2–3 articles were reviewed in each session. However, these reports revealed that the faculty only elected the articles from the start and headed the sessions.<sup>29,30,33</sup>

Finally, for journal clubs to be more effective, some of the conditions have been listed that include continuous and regular manner, high rate of attendance, compulsory participation, and availability of well-prepared meeting for journal clubs that includes drinks and food, understanding of the learning goals of the participants, sensible article selection, and prominence in promoting the commitment of participant learners.<sup>12,45</sup>

In the present study, the questionnaire was anonymous, and the students responded freely with no consequences. In addition, the effectiveness of the journal club as a learning modality is not based only on the questionnaire but also on the question applied and the achievement of learning outcomes of the journal club.

In addition, the role of students in integrated-based teaching is increased to a degree close to that of faculty, this role has been suggested by Harden "The changing role of medical students; students as assessor, curriculum collaborator, information processor, facilitator of learning, professional, scholar and teacher"<sup>46</sup> and accordingly, the students can give their feedback freely without any pressure. From this point, the questionnaire used for the students is the same for faculty to facilitate the identification of areas of weakness and compare the results between students and faculty. In addition, some closed questions were applied to faculty, but we did not find any of these responses for the closed questions were important to enrich the study.

## Limitation of the Study

No control group in our study. In the integrated medical program, the learning tools are selected and unified for all students. So, the selected topics for journal clubs must be delivered by journal clubs to ensure justice among students.

The second limitation is the shortage of journal club data for the undergraduates, most of the literature focused mainly on the residency in their workplace. So, comparative studies with previous studies are difficult to obtain.

## Conclusion

The insertion of a journal club in the integrated endocrinology/endocrine surgery module showed high levels of satisfaction among students and faculty. Journal club initiates, promotes enhances the acquisition of knowledge among the students. As most integrative medical programs give more attention to student-centered learning, the insertion of a journal club widely in the curriculum will expose the students early to be lifelong learners and to remain contemporary with the literature.

## Data Sharing Statement

Data will be made available on request.

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## Author Contributions

The author made a full contribution in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

## Disclosure

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