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ARTICLE

IMPACT OF A "JOURNAL CLUB" ON THE CONFIDENCE OF DENTAL STUDENTS TO CRITICALLY APPRAISE A CLINICAL TRIAL.

Impacto de un "Club de Revistas" en la confianza de estudiantes de Odontología para valorar críticamente un ensayo clínico.

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ABSTRACT:

Introduction: Journal clubs are a strategy that allows students to be exposed to critical appraisal of articles from the early stages of their training. Its long-term impact on the formation of competencies is debated.

Objetive: To evaluate if the sessions of a Journal Club increase the confidence that Dentistry students have in their abilities to critically appraise a clinical trial.

Material and Methods: A prospective cohort study that involved 21 students from the Faculty of Dentistry of the Universidad Nacional Mayor de San Marcos (Lima, Peru) who participated in six Journal Club monthly sessions. The sessions involved the analysis and discussion of clinical trials. Confidence to critically appraise an article before and after was assessed using a self-administered scale. Final and baseline scores were analyzed using a Wilcoxon test.

Results: Nineteen students finished all the sessions. Scores before the sessions were on average 2.09±1.17, while after the sixth session an average of 3.53±0.26 was obtained (p<0.05). Both males and females had improved scores after the sessions; however, there were no differences between them (p=0.08). The third- and fourth-year students presented significant changes in their scores (p<0.05).

Conclusion: The constant participation in the sessions of a Journal Club improved the confidence that students have when critically evaluating a clinical trial article.

KEYWORDS:

Evidence-Based Medicine; Trust; Students; Students Dental; Education Dental; Journal Article.

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RESUMEN:

Introducción: Los clubes de revistas son una estrategia que permiten exponer a los estudiantes a la valoración crítica de artículos desde etapas tempranas de su formación. Su impacto a largo plazo en la formación de competencias es discutido.

Objetivo: Evaluar si las sesiones de un Club de Revistas permiten aumentar la confianza que tienen los estudiantes de Odontología en las habilidades para valorar críticamente un ensayo clínico.

Material y Métodos: Estudio de cohorte prospectivo que involucró 21 estudiantes de la Facultad de Odontología de la Universidad Nacional Mayor de San Marcos (Lima. Perú) que participaron de seis sesiones mensuales de un Club de Revistas. Las sesiones implicaron el análisis y discusión de ensayos clínicos. Se evaluó la confianza para valorar críticamente un artículo antes y después a través de una escala autoadministrada. Las puntuaciones finales y basales se analizaron a través de una prueba de Wilcoxon.

Resultados: 19 estudiantes finalizaron la totalidad de las sesiones. Las puntuaciones antes de las sesiones evidenciaron una media de 2,09 ± 1,17, mientras que después de la sexta sesión se obtuvo una media de 3,53 ± 0,26 (p<0,05). Tanto varones como mujeres evidenciaron mejorar su puntuación media luego de las sesiones; sin embargo, no evidenciaron diferencias entre ellos (p=0,08). Los estudiantes de tercer y cuarto año presentaron cambios significativos de sus puntuaciones (p<0,05).

Conclusión: La participación constante a las sesiones de un Club de Revistas permitió mejorar la confianza que tienen los estudiantes al momento de valorar críticamente un artículo del tipo ensayo clínico.

PALABRAS CLAVE:

Medicina Basada en la Evidencia; Confianza; Estudiantes; Estudiantes de odontología; Educación en odontología; Artículo de revista.

INTRODUCTION.

Critical appraisal is the ability to assess the quality and relevance of research in a specific setting or context. It is an important skill for professionals because it allows them to analyze sources of information that may be used in clinical care.[1]

As scientific production in the health sciences increases progressively worldwide, students and professionals are required to critically assess this production. However, students indicate that as the training they have received for the analysis of information sources is inadequate, they fail to understand Evidence-Based Medicine (EBM); EBM is an approach that requires critical understanding of information sources for decision-making.

Consequently, low confidence in the critical appraisal of articles and few opportunities to participate in activities that allow them to develop these skills are usually reported.[2]

This problem seems to be rooted in factors such as the limited time allotted for teaching critical appraisal within a program, lack of prior research experience, inability to participate in research projects, lack of academic mentors, and excessive time spent on non-research activities.[3]

Despite these limitations, some research experiences have allowed early exposure of students to scientific literature with the aim of developing analytical skills from the early stages of undergraduate training. Journal Clubs (JCs) are a type of research experience that link research to clinical practice, promoting critical review of scientific literature as part of continuing medical education.

Journal Clubs also stimulate academic discussion and networking among colleagues and peers.[4] They have a long history of promoting the review

of medical literature and encouraging academic debate. Their meetings emphasize discussion and evaluation of scientific evidence to help students develop their own critical appraisal skills.

The need to train students and residents who can understand the care process based on scientific evidence is increasingly seen as a compelling need in university programs. These skills are progressively considered as a requirement for admission to internships and postgraduate degrees. Some post-graduate programs require that the applicant know how to critically appraise a scientific article to be considered as a suitable candidate.[5]

JCs offer a learning environment that can serve as an educational experience and a real-world example of the application of evidence-based medicine. For most of the 20th century, JCs have been used in the medical field and in higher education.[6] They have been seen as a mechanism by which health professionals can update their knowledge, promote critical thinking and research, assess the validity and applicability of the literature, improve their skills in critical appraisal, increase the use of the literature in clinical practice, and influence changes in care practices.[7]

Journal Clubs are usually seen as a good tool for exposing learners and practitioners to current literature.[8] However, some concerns have been raised that they do not develop critical thinking, that articles are often selected ad hoc, and that there are multiple ways to implement them as well as to appraise them.[9] Despite several reviews indicating the benefits of journal clubs, their effects and impact on student learning have not yet been clearly established. Findings related to their impact and efficacy in the short and long term have been analyzed, but discussions have yielded discrepant results.[8,9]

The aim of this study was to evaluate the impact that participating in a JC has on the confidence to critically appraise a scientific article consisting of a clinical trial in a group of undergraduate students. Its importance lies in the fact that knowing about the effects of participating in JCs allows universities, postgraduate courses, and hospitals to determine the usefulness of this strategy, how to implement it and how to continue conducting studies on its contribution to the training process of students.

MATERIALS AND METHODS.

A prospective cohort study was designed using a quantitative approach (pre- and post-tests). The study exposed 21 students from the Scientific Society of Dentistry Students (SCEO, for its acronym in Spanish) of Universidad Nacional Mayor de San Marcos, Lima, Perú, to multiple sessions of a Journal Club (JC). This study is not part of the curricular activities of the program, so it is considered a research based on an independent project. The aim of the JC was to improve critical appraisal skills in a group of undergraduate students. This research was approved by the Institutional Ethics Committee of the Pontificia Universidad Católica del Perú as part of the doctoral thesis of the author.

Participants were undergraduate students from the School of Dentistry. The leader of the JC was a teacher advisor to the SCEO. The person in charge of directing and moderating the session was the teacher; however, the one in charge of selecting the articles to be discussed in each session was a student who voluntarily selected the article and shared it before each meeting.

The students were invited to participate in the JC sessions by electronic means and through a poster that was shared on social networks. The invitation indicated the time of the sessions, the objective, the access link, and the title of the article to be discussed. This invitation was not mandatory, and students could voluntarily participate in all the sessions or withdraw when they considered it pertinent.

The JC followed a Flipped Journal Club approach, that is, the article was submitted for discussion a week before the session. Six sessions were held the third Saturday of each month from 5:00´p.m. to 7:00 p.m. (with active breaks of five minutes every forty minutes). In each session, an article consisting of a clinical trial was analyzed.

The sessions were held from February to July 2020. They were held virtually through the Zoom platform due to the sanitary restrictions imposed in Peru during the COVID pandemic, which limited face-to-face meetings. In this sense, each student and the responsible teacher joined the session from their homes.

One week before the first session, the lead teacher sent a structured guide that facilitated the analysis of the articles (structured appraisal). The guide consisted of the indicators proposed by the CONSORT protocol[10] for the writing of clinical trials. The topic of the clinical trials was unrestricted and, as indicated in previous paragraphs, the article was chosen by a designated student.

In this sense, trials related to Pediatric Dentistry, Implantology, Oral Rehabilitation, and Restorative Aesthetics were analyzed. Participants were also recommended to have food and drinks during the meeting, although this could not be corroborated in all the cases. The analysis process of the article in each session is summarized in Figure 1.

Figure 1. Stages of the selection and analysis of the scientific article that were followed in each session of the journal club (JC). Italics indicate the person responsible for the stage.

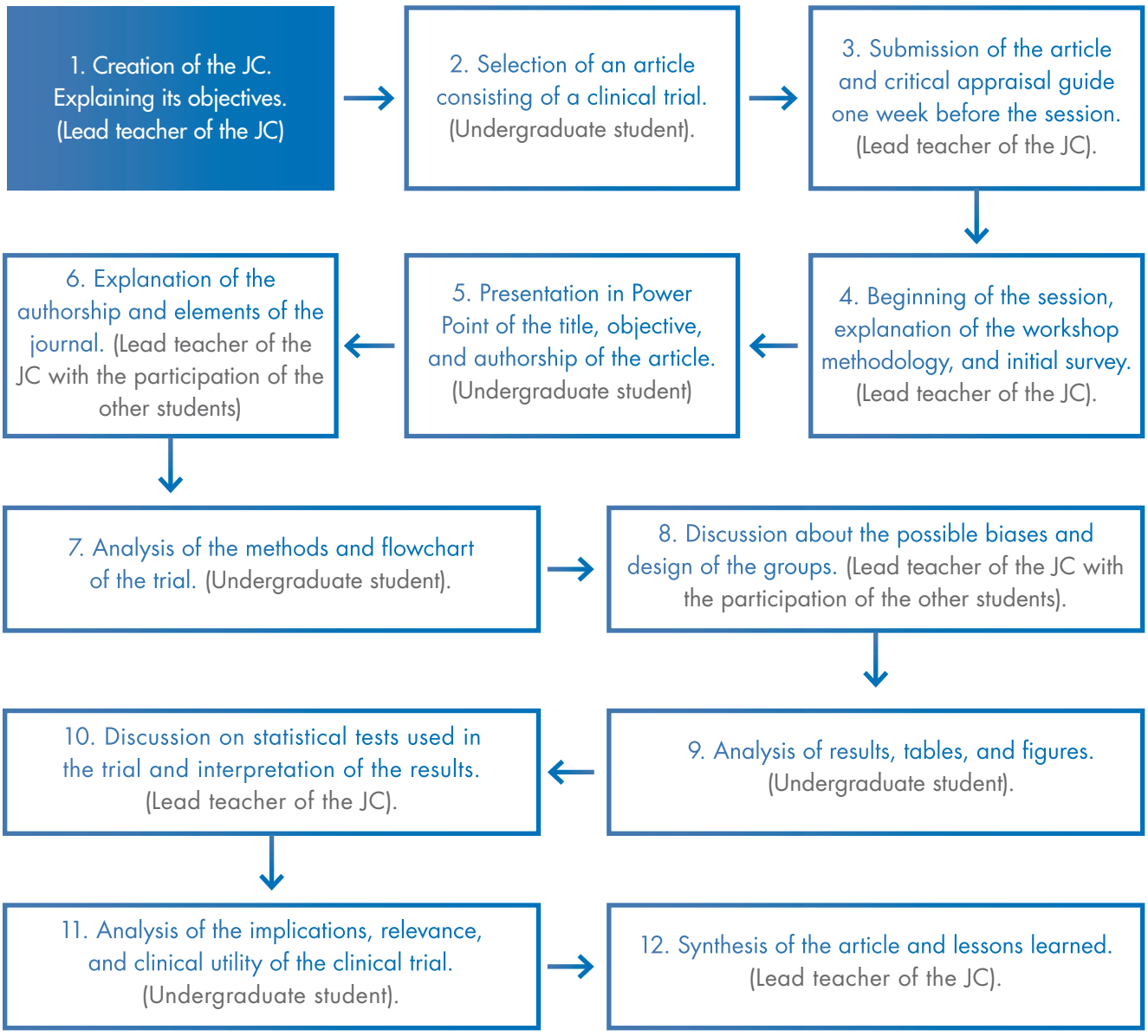

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Table 1. Characteristics of the group that participated in the journal club sessions.

CHARACTERISTICS		FREQUENCY/ MEAN (%)
Gender (n and %)	Male	7 (35)
	Female	12 (65)
	Total	19 (100)
Age (years; Mean and Standard Deviation ±)	Male	23.25 ± 2.45
	Female	22.5 ± 1.75
	Total	22.9 ± 2.1
Academic year (n and %)	Second	1 (5.3)
	Third	9 (47.4)
	Fourth	4 (21.1)
	Fifth	2 (10.5)
	Sixth	3 (15.8)
	Total	19 (100)
Published articles	Yes	3 (15.8)
	No	16 (84.2)
	Total	19 (100)
Previous presentations	Yes	6 (31.6)
	No	13 (68.4)
	Total	19 (100)
Attendance to academic events	Yes	12 (64.2)
	No	7 (36.8)
	Total	19 (100)
Scientific writing courses	Yes	2 (10.5)
	No	17 (89.5)
	Total	19 (100)

Before starting the first session and at the end of the sixth session, a survey was conducted to assess the students' confidence to critically appraise scientific articles and the personal characteristics of each participant. The survey consisted of a scale that included 13 questions based on the studies conducted by Gokani *et al.*,[11] and Gurney *et al.*,[12] using a five point Likert scale (from Strongly disagree to Strongly agree; where a score of 5 indicated a strong agreement with the question). The scale was subjected to content validity through experts who first assessed the linguistic translation from English to Spanish, and then the clarity and relevance of the questions.

Subsequently, a reliability analysis was carried out through a pilot study that included 15 students who did not participate in the JC and whose answers allowed an analysis through the alpha coefficient, obtaining a value of 0.88.

Personal characteristics included: age, gender, academic year, experience publishing articles, experience of having given a presentation, experience attending academic events, and experience of having taken scientific writing courses.

The data were entered in SPSS software version 23. The results were presented as numerical descriptive statistics. The comparison between the final and initial scores was made through the

Wilcoxon rank test. The comparison of scores and personal characteristics was carried out through the U-Mann Whitney and Kruskal Wallis test. A significance level of 0.05 was accepted. Explicit informed consent was obtained online from the participants before and after the JC, keeping their answers anonymous.

RESULTS.

Twenty-one undergraduate students participated from the first session of the JC. However, only 19 students completed the process. Two students dropped out in the fourth session, resulting in a 90% follow-up rate. Of the 19 students who were included in the study, 65% were female (n=12), their mean age was 22.9±2.1 years, and 47% were in their third academic year (Table 1).

Confidence scores to critically appraise scientific articles before the sessions showed a mean of 2.09±1.17, while after the sixth session a mean of 3.53±0.26 was obtained, yielding a difference of 1.43±0.32 (p<0.05).

Table 2. Scores of *"confidence to critically appraise scientific articles"* according to times of measurement and questions.

No.	QUESTIONS	SCORE (MEAN) BEFORE THE SESSIONS	AFTER THE SESSIONS	DIFFERENCE	*p*-value
1	I am able to critically appraise a research article.	1.89 ± 0.65	3.31 ± 0.67	1.42 ± 1.07	0.021*
2	I have experience critically. appraising scientific articles.	2.32 ± 0.58	3.26 ± 0.56	0.94 ± 0.70	0.067
3	I know how to appraise the methodological component of scientific articles.	2.63 ± 0.89	3.63 ± 0.76	1 ± 1.05	0.121
4	I am able to write a letter to the editor.	2.15 ± 0.68	3.31 ± 0.67	1.15 ± 0.89	0.089
5	I understand why critical ap praisal of articles is important to my professional training and future career.	2.10 ± 0.80	3.42 ± 0.76	1.31 ± 1.10	0.020*
6	I am able to identify relevant information about a clinical trial (for example, its methodology, study design, inclusion and exclusion criteria, power analysis).	2.10 ± 0.87	3.63 ± 0.76	1.52 ± 0.90	0.001*
7	I am able to identify the types of error in a study (for example, type I and type II errors in a clinical trial).	1.47 ± 0.69	3.31 ± 0.47	1.84 ± 0.83	0.001*
8	I am able to identify sources of bias in a clinical trial.	1.73 ± 0.73	3.57 ± 0.60	1.84 ± 0.95	0.001*
9	I am able to understand, analyze, and criticize different statistical tests presented in clinical trials.	1.94 ± 0.77	3.68 ± 0.82	1.73 ± 1.09	0.002*
10	I am able to assess the external and internal validity of a clinical trial.	2.21 ± 0.78	3.78 ± 0.78	1.57 ± 0.96	0.001*
11	I am able to calculate and interpret risks (*e.g.*, relative risk, absolute risk reduction).	2 ± 0.81	3.73 ± 0.80	1.73 ± 1.04	0.001*
12	I am able to interpret the results presented in clinical trials.	2.68 ± 0.82	3.52 ± 0.61	0.84 ± 0.95	0.067
13	I am able to determine whether the results of a clinical trial are statistically or clinically important.	2 ± 0.74	3.68 ± 0.74	1.68 ± 0.94	0.021*
	TOTAL	2.09 ± 1.17	3.53 ± 0.26	1.43 ± 0.32	0.011*

*: p<0.05 Wilcoxon rank test.

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Table 3. Scores of the *"confidence to critically appraise scientific articles"* according to times of measurement and characteristics of the participants.

CHARACTERISTICS		SCORES (MEAN AND STANDARD DEVIATION)			
		BEFORE	AFTER	DIFFERENCE	*p*-value
Gender	Male	2.10 ± 0.16	2.08 ± 1.18	3.54 ± 0.25	0.001*
	Female	3.51 ± 0.28	1.43 ± 0.33	1.42 ± 0.33	0.001*
Academic year	Second	2.07	3.84	1.76	0.022*
	Third	2.04 ± 1.14	3.61 ± 0.31	1.57 ± 0.30	0.011*
	Fourth	2.11 ± 1.14	3.51 ± 1.11†	1.40 ± 0.38	0.001*
	Fifth	2.23	3.30†	1.07	0.030*
	Sixth	2.15 ± 1.33	3.33 ± 1.19	1.17 ± 0.08	0.065
Published articles	Yes	2.15 ± 1.33	3.33 ± 1.19	1.17 ± 0.08	0.011*
	No	2.08 ± 1.17	3.56 ± 0.26	1.48 ± 3.33	0.015*
Previous presentations	Yes	2.11 ± 1.93	3.43 ± 1.15	1.32 ± 0.31	0.024*
	No	2.08 ± 1.68	3.57 ± 2.29	1.48 ± 0.32	0.031*
Attendance to academic events	Yes	2.12 ± 1.19	3.46 ± 0.24	1.33 ± 0.32	0.110*
	No	2.04 ± 1.12	3.63 ± 0.27	1.59 ± 0.28	0.048*
Scientific writing courses	Yes	2.19 ± 1.16	3.42 ± 1.16	1.23	0.051
	No	2.08 ± 1.17	3.54 ± 0.27	1.45 ± 0.33	0.022*

*: $p<0.05$ Wilcoxon rank test. †: $p<0.05$ intra-group Kruskal Wallis test.

Questions related to the "ability to identify the types of error in a study" and "ability to identify the sources of bias in a clinical trial" presented the greatest variation in score (1.84±0.83 and 1.84±0.95, respectively) (Table 2).

Confidence scores to critically appraise articles showed improvements from the first session to the end of the Journal Club. Males and females showed an improvement in their mean score after the sessions; however, there were no differences between them ($p=0.08$). Third-year and fourth-year students presented significant changes in their scores ($p<0.05$).

Although having published articles, having given presentations, and having taken writing courses showed significant changes before and after, no differences were found in the scores with those students who did not have such experiences (Table 3).

DISCUSSION.

Journal Clubs (JCs) provide an interactive method to understand scientific evidence disseminated in journals and similar publications. A JC is defined as a group of people who meet regularly to discuss the clinical applicability of articles published in biomedical journals.[13]

Thus, the philosophy of the JC since its inception was to share current knowledge and analyze it for patient care. In the present study, it was evaluated how the participation in multiple sessions of a JC could improve the confidence of students when they have to critically appraise a scientific article.

The results obtained confirm that confidence improved in the students who participated in all the sessions. This finding coincides with the systematic reviews[8,9] that summarize the effectiveness of JCs for the development of critical appraisal skills.

The review by Deenadayalan *et al.*,[14] found that

more than 80% of the articles reported that the JC intervention was effective in improving knowledge and critical appraisal skills.

This confidence is achieved if the objective of Journal Clubs (JCs) is kept in mind in all the sessions and some of the following aspects are considered: using personalized tutoring, using didactic strategies, using structured learning materials, such as checklists for critical evaluation; forming a club that uses adult learning principles, integrating topics and activities with clinical practice, using a multifaceted approach to teaching and learning.[15]

A Journal Clubs (JCs) has three purposes: to teach and develop critical appraisal skills, to increase exposure to biomedical literature, and to aid in the dissemination of clinical research. The meetings held in the present study made it possible to promote interest in research while learning from experts.

It is possible to get closer to the authors and editors of journals, allowing a greater dissemination of scientific articles, promoting discussion and reflection among the participants, answering questions, exploring practical applications, and generating an open discussion among students who are interested in topics that are unknown to them. The present study included six monthly sessions to improve the confidence of the students; However, there is no agreement regarding the ideal number of sessions. Green *et al*.,[16] showed that an 11-week evidence-based course and JC were positively received by students.

Landi *et al*.,[17] also found that three Journal Clubs (JCs) sessions improved confidence in the critical appraisal of clinical research. Maloney *et al*.,[18] found that four sessions and didactic teaching to students developed a greater ability to find, appraise, and apply medical research articles in a JC.

Edwards *et al*.,[19] suggest that three JC sessions received positive comments and resulted in the publication of 26 Letters to the editor. It has also been found that a single session can improve confidence towards critical appraisal, even without the presence of follow-up sessions.[11]

It seems that in order to achieve the objectives of each session, the structure and guidance in the discussion of the articles is more important than the number of sessions.

It was not found that those students who had experiences publishing articles or taking scientific writing courses had better scores than those who did not have such experiences. This may be due to the fact that the appraisal of scientific articles requires different skills than those of writing and scientific dissemination. Critical appraisal is the ability to evaluate the quality and relevance of research in a specific context. It requires specific knowledge of biostatistics, methodology, epistemology, specific techniques, and experience conducting research in a specific field.

This may mean that the fact of having taken courses or given presentations has not influenced the differences in scores. Critical appraisal of articles is not the only skill learned by participating in a JC. Journal Clubs (JCs) lead to more positive attitudes towards reading and thus motivate participants to keep their knowledge up to date.

Positive attitudes toward participating in Journal Clubs (JCs) are not necessarily related to a change in reading behavior. The study by Akhund *et al*.,[21] found that although 70% believed that a JC provides a stimulus for additional reading, and 89% agreed that it was educationally valuable, only 44% associated participation with an improvement in the behavior towards reading.

In the review by Harris *et al*.,[15] it was found that some studies reported improvements in reading behavior, others showed increased confidence in critical appraisal, better scores on critical appraisal tests, and greater ability to use the findings in clinical practice. In the study by Gurney *et al*.,[12] a preparatory journal club session that guided students helped increase students' confidence. The review by Honey *et al*.,[21] showed that of 16 studies, 15 claimed improvements in knowledge, various skills, and behaviors.

This study is not exempt from limitations, the number of students who participated in the sessions was small, so the findings cannot be generalized.

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Consequently, it is advisable to get more students to participate in this type of sessions; however, it is likely that many of them do not complete all the sessions and that there will be a percentage of dropouts. It was also not possible to compare it with a "control" group (students who do not participate in a Journal Clubs (JCs)), so it would not be clear if there are other variables that could influence the results.

One strength of the present study was having used a validated instrument, since multiple studies involve self-reports that can bias their findings. Although there is consistent statistical evidence of the effectiveness of Journal Clubs (JCs) in improving knowledge, there is little evidence of long-term results. This would seem to be an area for future research, particularly considering the half-life of knowledge acquisition. Self-reported and unvalidated measurements raise concerns about the credibility of JC's reported impact, as well as the limited generalizability of JC formats to other settings or contexts.

CONCLUSION.

It is concluded that constant participation in JC sessions allowed students to improve their confidence when critically appraising a clinical trial.

This training strategy helps educators and authorities of the dental schools if they want to improve research skills and critical appraisal of articles in their students from the early stages of university education.

Conflict of interests:

The author has no conflict of interest.

Ethics approval:

Informed consent was obtained from study participants and study protocol was approved by the Institutional Ethics Committee of the Pontificia Universidad Católica del Perú.

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The author conducted the entirety of the work presented.

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REFERENCES.

1. Borrelli MR, Farwana R, Gundogan B, Al Omran Y, Pidgeon TE, Agha R. How to apply for the academic foundation programme. Ann Med Surg (Lond). 2018;29:5-9. doi: 10.1016/j.amsu.2018.01.008. PMID: 29692889; PMCID: PMC5911668.
2. STARSurg Collaborative. Medical research and audit skills training for undergraduates: an international analysis and student-focused needs assessment. Postgrad Med J. 2018;94(1107):37-42. doi: 10.1136/post-gradmedj-2017-135035. Erratum in: Postgrad Med J. 2018;94(1108):86. Evans, David [added]. Erratum in: Postgrad Med J. 2018;94(1112):324. PMID: 28866608.
3. Metcalfe D. Involving medical students in research. J R Soc Med. 2008;101(3):102-3. doi: 10.1258/jrsm.2008.070393. PMID: 18344462; PMCID: PMC2270240.
4. Topf JM, Sparks MA, Phelan PJ, Shah N, Lerma EV, Graham-Brown MPM, Madariaga H, Iannuzzella F, Rheault MN, Oates T, Jhaveri KD, Hiremath S. The Evolution of the Journal Club: From Osler to Twitter. Am J Kidney Dis. 2017;69(6):827-836. doi: 10.1053/j.ajkd.2016.12.012. PMID: 28233653.
5. Mhaskar R, Emmanuel P, Mishra S, Patel S, Naik E, Kumar A. Critical appraisal skills are essential to informed decision-making. Indian J Sex Transm Dis AIDS. 2009;30(2):112-9. doi: 10.4103/0253-7184.62770. PMID: 21938133; PMCID: PMC3168054..
6. Langkamp DL, Pascoe JM, Nelson DB. The effect of a medical journal club on residents' knowledge of clinical epidemiology and biostatistics. Fam Med. 1992;24(7):528-30. PMID: 1397827.
7. Kovacevic MP, Baroletti S, Galal SM, Szumita PM. Journal Club Standardization Tool: Helping participants get the JIST. Curr Pharm Teach Learn. 2018;10(3):367-372. doi: 10.1016/j.cptl.2017.11.012. PMID: 29764642.
8. Kyriakoulis K, Patelarou A, Laliotis A, Wan AC, Matalliotakis M, Tsiou C, Patelarou E. Educational strategies for teaching evidence-based practice to undergraduate health students: systematic review. J Educ Eval Health Prof. 2016;13:34. doi: 10.3352/jeehp.2016.13.34. PMID: 27649902; PMCID: PMC5066070.
9. Ilic D, de Voogt A, Oldroyd J. The use of journal clubs to teach evidence-based medicine to health professionals: A systematic review and meta-analysis. J Evid Based Med. 2020;13(1):42-56. doi: 10.1111/jebm.12370. PMID: 31951092.
10. Equator Network. Search for reporting guidelines. CONSORT 2010 Statement: updated guidelines for reporting parallel group randomised trials Available at: http://www.consort-statement.org/
11. Gokani SA, Sharma E, Sharma T, Moudhgalya SV, Selvendran SS, Aggarwal N. Impact of a National Journal Club and Letter Writing Session on Improving Medical Students' Confidence with Critical Appraisal. Adv Med Educ Pract. 2019;10:1081-1087. doi: 10.2147/AMEP.S235260. PMID: 31920419; PMCID: PMC6935270.
12. Gurney MK, Buckley K, Karr S. Evaluation of a journal club preparatory session on student confidence for a graded journal club. Curr Pharm Teach Learn. 2019;11(12):1221-1230. doi: 10.1016/j.cptl.2019.09.011. PMID: 31836146.
13. Mezgebe M, Chesson MM, Thurston MM. Pharmacy student perceptions regarding understanding of and confidence in literature evaluation following a student-led journal club. Curr Pharm Teach Learn. 2019;11(6):557-564. doi: 10.1016/j.cptl.2019.02.018. PMID: 31213310.
14. Deenadayalan Y, Grimmer-Somers K, Prior M, Kumar S. How to run an effective journal club: a systematic review. J Eval Clin Pract. 2008;14(5):898-911. doi: 10.1111/j.1365-2753.2008.01050.x. PMID: 19018924.
15. Harris J, Kearley K, Heneghan C, Meats E, Roberts N, Perera R, Kearley-Shiers K. Are journal clubs effective in supporting evidence-based decision making? A systematic review. BEME Guide No. 16. Med Teach. 2011;33(1):9-23. doi: 10.3109/0142159X.2011.530321. PMID: 21182379.
16. Green BN, Johnson CD. Use of a modified journal club and letters to editors to teach critical appraisal skills. J Allied Health. 2007;36(1):47-51. PMID: 17425191.
17. Landi M, Springer S, Estus E, Ward K. The Impact of a Student-Run Journal Club on Pharmacy Students' Self-Assessment of Critical Appraisal Skills. Consult Pharm. 2015;30(6):356-60. doi: 10.4140/TCP.n.2015.356. PMID: 26048467.
18. Maloney LM, Marshall RT, Werfel PA, Johnson SE. Using a Journal Club Series to Introduce Paramedic Students to Research Fundamentals and Critical Appraisal of Medical Literature. Prehosp Disaster Med. 2019;34(4):449-453. doi: 10.1017/S1049023X19004618. PMID: 31322497.
19. Edwards R, White M, Gray J, Fischbacher C. Use of a journal club and letter-writing exercise to teach critical appraisal to medical undergraduates. Med Educ. 2001;35(7):691-4. doi: 10.1046/j.1365-2923.2001.00972.x. PMID: 11437973.
20. Akhund S, Kadir MM. Do community medicine residency trainees learn through journal club? An experience from a developing country. BMC Med Educ. 2006;6:43. doi: 10.1186/1472-6920-6-43. PMID: 16925800; PMCID: PMC1564014.
21. Honey CP, Baker JA. Exploring the impact of journal clubs: a systematic review. Nurse Educ Today. 2011; 31(8):825-31. doi: 10.1016/j.nedt.2010.12.020. PMID: 21247668.