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Research Article

Postgraduate Dental Students' Perceptions of Evidence-Based Dentistry at the University of Benghazi

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ABSTRACT

This cross-sectional study investigated perceptions, attitudes, self-reported knowledge, evidence-seeking behavior, and confidence related to Evidence-Based Dentistry (EBD) among postgraduate dental students at the Faculty of Dentistry, University of Benghazi. All 159 enrolled postgraduate students were invited to participate during October-November 2022, and 112 completed the questionnaire, giving a response rate of 70.4%. Data was collected using a self-administered questionnaire consisting of socio-demographic and educational items and the validated Knowledge, Attitudes, Access, and Confidence Evaluation (KACE) instrument. The KACE instrument comprised 35 items across four domains: knowledge, attitudes, behavior in accessing evidence, and confidence in critical appraisal. Participants showed low EBD knowledge (mean 2.7 +/- 2.2 out of 10), moderately positive attitudes (mean 5.4 +/- 2.6 out of 10), moderate evidence-seeking behavior (mean 10.7 +/- 4.0 out of 18), and fair confidence in critical appraisal (mean 6.4 +/- 3.7 out of 12). The knowledge domain showed a floor effect (21.4%), indicating limited understanding of core EBD concepts or possible item difficulty. Significant differences were observed for knowledge by postgraduate specialty ($P = 0.009$), attitude by prior research/statistics training ($P = 0.002$) and current academic level ($P = 0.021$), and behavior by prior research/statistics training ($P = 0.049$). These findings indicate a gap between awareness of EBD and its effective implementation. Integrating structured, competency-based EBD education within undergraduate and postgraduate curricula is needed to strengthen evidence-based clinical practice and improve oral health care quality in Libya.

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1. Introduction

Evidence-based practice (EBP) is a patient-centered approach to practice and make clinical decisions, and it is assumed to be the best contemporary approach to provide scientific, safe, efficient and cost-effective interventions [1]. EBP has become very widespread and considered as an essential requirement in the dental practices [2]. According to the American Dental Association (ADA), Evidence-based Dentistry (EBD) is defined as an approach to oral health care that requires the judicious integration of systematic assessments of clinically relevant scientific evidence, relating to the patient's oral and medical condition and history, together with the dentist's clinical expertise and the patient's treatment needs and preferences [3].

Even though evidence-based treatments for prevention and management are known and widely spread, the available knowledge is rarely applied to improve the care practice [4]. Regarding dentistry, it delays behind many medical specialties in promoting the uptake of research-based treatments, although most dentists believe they are practicing evidence-based dentistry [5]. This gap between knowledge and practice in providing dental care can be attributed to the academic dental institutions' usual use of passive learning environments [6]. This type of learning is characterized by memorization and repetition of isolated facts, which fails to develop the critical thinking and lifelong learning of the students [5]. Also, the passive learning environment fails to prepare students to address their communities' and practices' needs in future[5,6] Thus, there is a need to enable dentists to provide evidence-based oral care by adapting undergraduate and/or postgraduate dental curricula to teach students the expertise that is necessary to gather valid conclusions from the scientific research. This includes how to evaluate the design, methodology, analysis and interpretation of clinical trials or systematic reviews [7].

The Libyan undergraduate dental curriculum is a five-year program, comprising two years of theory-based foundational basic science followed by clinical science education integrated with patient care and clinical sessions in later years [8]. At the postgraduate level, the University of Benghazi offers advanced dental studies structured across two examination parts (Part I and Part II) and a research thesis. Currently, EBD is not a formal standalone subject in either the undergraduate or postgraduate curriculum. Instead, it is introduced indirectly within research methodology courses during the undergraduate fourth year and postgraduate Part I. This ancillary approach may leave dental practitioners with only a tacit understanding of EBD principles and may limit consistent application in clinical and academic settings [9]. A review of the available published literature identified no studies specifically evaluating knowledge, attitudes, practices, and confidence related to EBD among postgraduate dental students in Libya; therefore, evidence from this setting remains limited.

Therefore, this study aimed to investigate perceptions, attitudes, self-reported knowledge, evidence-seeking behavior, and confidence related to EBD among dental postgraduate students at the Faculty of Dentistry, University of Benghazi. Specifically, it assessed students' confidence in evaluating scientific literature and their preferred sources of evidence. The findings provide baseline data on EBD engagement in this Libyan postgraduate dental education setting and may inform curriculum development.

2. Methodology

This cross-sectional study was conducted at the Faculty of Dentistry, University of Benghazi, during October and November 2022. At the time of the study, 159 postgraduate students were enrolled at the faculty, and all enrolled postgraduate students were invited to participate. Eligible participants included registered postgraduate dental students in Part I, Part II, or the research stage during the study period. Students who were not enrolled at the time of data collection or who declined participation were excluded. A total of 112

students returned complete questionnaires and were included in the analysis, yielding a response rate of 70.4% (112/159). No imputation was required because there were no missing data in the analyzed questionnaires.

Data were collected using a self-administered questionnaire distributed as hard copies by the authors. Participants were asked to complete the questionnaire within one week of the drop-off date. The questionnaire was administered in English because English is the language of dental instruction and assessment in the postgraduate program. No translation or cultural adaptation was performed because the KACE instrument had been validated in English; however, the authors reviewed the items for contextual suitability before distribution. The questionnaire had two parts. The first consisted of seven questions on socio-demographic and educational characteristics, including age, gender, year and institution of the first dental degree, practice type, previous research methods or statistics training outside the undergraduate and postgraduate curricula, specialty, and current academic level (Part I, Part II, or research stage). The second part was the validated Knowledge, Attitudes, Access, and Confidence Evaluation (KACE) instrument developed by Hendricson et al. [10]. It is an English-language questionnaire comprising 35 questions categorized into four subscales: knowledge, attitudes, behavior in accessing evidence, and confidence in critical appraisal.

2.1.Knowledge of EBP principles

This domain consists of ten multiple-choice questions with one best response for each, including the option of “I don’t know”. Each question is scored and then the number of correct answers is determined for each participant with possible values ranging from 0 to 10.

2.2.Attitudes regarding EBP

This domain used ten qualitative statements rated on a five-point Likert scale: strongly agree, agree, uncertain, disagree, and strongly disagree. For analysis and consistency with the scoring approach used in the KACE instrument, responses were dichotomized to indicate positive versus non-positive attitudes. Strongly agree and agree were awarded 1 point, whereas uncertain, disagree, and strongly disagree were awarded 0 points. Items 7 ('It has been difficult for me to practice evidence-based dentistry in the past year') and 8 ('EBP is cook-book dental care that disregards clinical experience in providing the best treatment for patients') were reverse-scored; strongly disagree, disagree, and uncertain were awarded 1 point, whereas agree and strongly agree were awarded 0 points. The overall score ranged from 0 to 10, with higher scores indicating a more positive attitude.

2.3.Behavior in accessing evidence

In this domain, participants use a five-point scale to rank frequency of their utilization of nine health care resources. A five-step Likert scale was used, as follows: Never, Rarely, Occasionally, Often, and Very frequently. The scoring was as follows: “Never and Rarely” = 0, “Occasionally” = 1, and “often and Very frequently” = 2. The overall score ranging from 0 to 18, as higher scores, indicated that postgraduate students were more utilized for health care resources.

2.4.Confidence in critical appraisal

This domain measures confidence in critical appraisal, by using a five-point scale to rate the confidence regarding a list of six components in a published research report. A five-step Likert scale was used, as follows: Not at all Confident, Not Confident, Moderately Confident, Confident, and Very Confident. The scoring was as follows: “Not at all Confident and Not Confident” = 0, “Moderately Confident” = 1, and “Confident and Very Confident” = 2. The overall score ranging from 0 to 12, with 12 being most desirable.

The collected data were analyzed using SPSS for Windows, version 25.0 (SPSS Inc.). Demographic data were summarized using frequencies and percentages. Subscale scores, descriptive statistics, and frequency distributions were generated. Ceiling and floor effects were evaluated based on the percentage of respondents with the maximum or minimum score and were considered present if the proportion was 15% or more [11]. Association among knowledge, attitude, behavior, and confidence scores were performed using

Spearman correlation coefficients. Partial correlation coefficients were also calculated after adjustment for potential confounders selected a priori, including age group, gender, year of BDS award, affiliation institution, practice type, previous research methods/statistics training, postgraduate specialty, and current academic level. Correlations below 0.20 were considered weak, 0.20-0.30 moderate, and >0.30 strong [12]. Because the data were skewed, nonparametric statistics were used (Mann-Whitney U or Kruskal-Wallis tests, as appropriate). The alpha value was 0.05.

2.5.Ethics approval and consent to participate

Ethical approval was obtained from the Research Ethics Committee of the Faculty of Dentistry, University of Benghazi (ref: 138/2022). Verbal informed consent was obtained from all participants before data collection. Participation was voluntary and anonymous, and participants were informed that non-participation would not affect their academic status.

3. Results and Discussion

A total of 112 postgraduate students completed the questionnaire, yielding a response rate of 70.4% (112/159) and a full dataset with no missing responses. The sample was predominantly female (82/112, 73.2%) and aged 30-40 years (84/112, 75.0%). Most participants were from the University of Benghazi (102/112, 91.1%), and 99/112 (88.4%) reported no prior formal training in research methods or statistics outside the undergraduate and postgraduate curricula.

Overall, participants demonstrated low knowledge levels regarding EBD, moderately positive attitudes, moderate evidence-seeking behavior, and fair confidence. Knowledge scores were slightly higher among participants specializing in pediatric dentistry, dental public health, and conservative dentistry and among those with prior research methods or statistics training.

Attitude scores were moderate and consistent across all demographic and academic subgroups. Behavior scores, indicative of EBP application, ranged from 10 to 11 out of a possible 18, suggesting a moderate level of engagement. Confidence in evaluating literature quality was also moderate overall.

A notable finding was that the highest median confidence score (8.5, IQR = 0) was reported by the subgroup with no clinical practice experience, indicating that at least 50% of these participants gave an identical high rating (Table 1).

Most comparisons across demographic and academic variables were not statistically significant ($P > 0.05$). Statistically significant findings were observed for knowledge by postgraduate specialty ($P = 0.009$), attitude by prior research/statistics training ($P = 0.002$), attitude by current academic level ($P = 0.021$), and behavior by prior research/statistics training ($P = 0.049$).

The knowledge scale showed a floor effect: 24 participants (21.4%) achieved the minimum score. This may indicate that the knowledge items were difficult or that respondents had limited EBD knowledge. No floor or ceiling effects were observed for the attitude, behavior, or confidence scales, as all corresponding values were below 15% (Table 2).

Correlation coefficients showed strong positive relationships between attitude and knowledge ($r = 0.499$), attitude and behavior ($r = 0.409$), and attitude and confidence ($r = 0.423$). Knowledge was also strongly correlated with confidence ($r = 0.343$). A weak correlation was observed between knowledge and behavior ($r = 0.155$), suggesting that knowledge alone may not translate into evidence-seeking behavior (Table 3). Adjusted correlations showed a similar pattern.

This study provides baseline evidence on postgraduate dental students' perceptions of EBD in Libya, addressing an under-studied area in dental education and highlighting the absence of EBD as a formal curricular component in the investigated setting. Overall, the findings revealed insufficient EBD knowledge, moderately positive attitudes, moderate evidence-seeking behavior, and fair confidence in critical appraisal skills.

Table 1: Knowledge, attitude, behavior, and confidence summary data, by sociodemographic characteristics of participants

Characteristics	Overall	Knowledge		Attitude		Behavior		Confidence	
	N[a] (%) (N=112)	Median (IQR)[b]	Mean (SD)[c]	Median (IQR)	Mean (SD)	Median (IQR)	Mean (SD)	Median (IQR)	Mean (SD)
Gender									
Male	30(26.8)	2.0(2.3)	2.4(1.9)	5.5(3.0)	5.4(2.6)	11.0(5.3)	10.7(4.2)	7.0(4.3)	6.5(3.6)
Female	82(73.2)	2.5(4.0)	2.7(2.3)	6.0(3.0)	5.4(2.6)	10.0(5.3)	10.7(3.9)	6.0(6.0)	6.3(3.7)
Age Group (Years)									
< 30	23(20.5)	3.0(4.0)	3.2(2.3)	7.0(2.0)	5.8(2.5)	12.0(5.0)	11.4(3.4)	6.0(6.0)	5.7(3.4)
30-40	84(75)	2.0(3.8)	2.5(2.1)	6.0(4.0)	5.2(2.7)	10.0(5.0)	10.6(4.0)	7.0(5.8)	6.5(3.7)
> 40	5.0(4.5)	2.0(2.5)	2.2(1.6)	7.0(3.0)	6.6(1.8)	7.0(10.5)	8.8(6.1)	10.0(7.5)	7.8(4.7)
Year of award of dental degree (BDS)									
<2010	38(33.9)	2.0(3.0)	1.9(1.8)	6.0(4.0)	5.1(2.8)	11.0(7.3)	10.4(4.8)	6.5(6.3)	6.5(4.0)
2010-2015	49(43.8)	3.0(3.5)	2.9(2.2)	6.0(3.0)	5.6(2.4)	10.0(5.0)	10.6(3.8)	7.0(5.5)	6.3(3.7)
>2015	25(22.3)	3.0(4.0)	3.2(2.4)	6.0(2.5)	5.6(2.6)	11.0(5.0)	11.0(3.1)	7.0(4.5)	6.5(3.3)
Affiliation Institution									
University of Benghazi	102(91.1)	2.0(3.0)	2.6(2.1)	6.0(3.0)	5.3(2.6)	10.0(5.3)	10.7(4.0)	7.0(5.3)	6.5(3.7)
Other Universities	10(8.9)	2.0(3.5)	2.5(2.0)	7.0(4.3)	5.9(2.8)	10.5(5.0)	10.7(3.9)	6.0(4.3)	5.2(3.3)
Practice type									
Government	46(41.1)	2.0(3.5)	2.5(2.2)	6.0(3.0)	5.3(2.7)	10.0(7.0)	10.3(4.5)	6.5(6.0)	6.5(3.7)
Private	10(8.9)	2.5(4.0)	2.6(2.6)	3.5(4.8)	3.8(2.7)	9.0(3.5)	9.7(2.8)	6.5(6.8)	6.1(3.8)
Academic	35(31.3)	3.0(4.0)	2.9(2.3)	6.0(4.0)	5.3(2.7)	10.0(6.0)	11.4(3.7)	7.0(7.0)	6.3(4.2)
None	2(1.8)	4.5(0.0)	4.5(0.7)	7.5(0.0)	7.5(2.1)	13.0(0.0)	13.0(1.4)	8.5(0.0)	8.5(2.1)
Government and Private	8(7.1)	2.5(1.0)	2.6(1.2)	7.0(2.8)	7.1(1.5)	12.5(5.8)	12.5(3.9)	6.5(5.8)	6.5(3.8)
Academic and Private	11(9.8)	2.0(2.0)	2.1(1.8)	6.0(3.0)	5.7(2.0)	10.0(5.0)	9.5(3.9)	6.0(3.0)	6.1(2.1)
Had taken research methods/Statistics course									
Yes	13(11.6)	3.0(2.5)	3.0(1.9)	7.0(2.0)[d]	7.2(2.1)	13.0(5.0)[d]	12.7(3.4)	7.0(6.5)	7.6(3.7)
No	99(88.4)	2.0(3.0)	2.6(2.2)	6.0(3.0)	5.2(2.6)	10.0(5.0)	10.4(4.0)	6.0(5.0)	6.2(3.7)
Major of postgraduate									
Oral Medicine	20(17.9)[d]	2.5(2.8)	2.5(1.9)	5.0(5.8)	4.3(3.0)	10.0(3.0)	10.5(3.1)	7.0(6.8)	6.7(4.0)
Oral pathology	19(17)	2.0(4.0)	2.4(2.2)	4.0(6.0)	4.9(3.3)	14.0(9.0)	11.4(5.2)	7.0(8.0)	6.4(4.4)
Oral biology	11(9.8)	1.0(2.0)	1.3(1.5)	5.0(4.0)	4.8(2.8)	10.0(7.0)	9.2(4.9)	7.0(8.0)	6.6(3.9)
Dental public health	14(12.5)	3.5(3.0)	3.6(1.9)	6.5(1.0)	6.5(0.8)	10.0(5.8)	10.9(4.0)	8.0(3.5)	7.9(3.3)

Pediatric dentistry	18(16.1)	3.5(4.3)	3.9(2.5)	7.0(2.3)	6.4(2.5)	10.0(5.5)	11.2(3.1)	6.0(3.3)	6.1(2.7)
Orthodontics	5(4.5)	3.0(4.0)	2.2(2.2)	7.0(3.0)	6.2(1.9)	12.0(4.5)	12.6(2.7)	8.0(4.0)	7.2(2.2)
Dental materials	9(8)	1.0(1.5)	1.0(1.3)	4.0(3.0)	4.7(1.7)	7.0(4.5)	8.2(3.5)	4.0(6.5)	4.4(3.9)
Conservative dentistry	16(14.3)	3.0(3.0)	2.8(2.1)	6.5(2.0)	5.8(2.4)	11.0(6.5)	11.1(4.2)	6.0(5.3)	5.9(3.7)
Level of current major									
Part I	33(29.5)	2.0(3.0)	2.2(2.0)	5.0(6.0)[d]	4.4(3.0)	10.0(3.5)	10.2(4.0)	6.0(6.0)	5.3(3.5)
Part II	33(29.5)	3.0(4.5)	3.0(2.4)	7.0(2.5)	6.2(2.3)	11.0(6.0)	11.3(4.3)	7.0(3.5)	6.9(3.3)
Research	46(41.1)	2.0(3.0)	2.7(2.1)	6.0(3.0)	5.5(2.3)	10.0(5.5)	10.6(3.8)	7.0(6.5)	6.8(3.9)

[a]N, number; %, percentage; [b]IQR, interquartile range; [c]SD, standard deviation; [d]P < 0.05 from Mann-Whitney U or Kruskal-Wallis tests. Exact significant P-values were: knowledge by postgraduate specialty, P = 0.009; attitude by prior research/statistics training, P = 0.002; attitude by current academic level, P = 0.021; behavior by prior research/statistics training, P = 0.049.

Table 2: Descriptive data on the knowledge, attitude, behavior, and confidence scales.

Variable	No. of Items	Mean (SD)[a]	Range	Floor effect N (%)[b]	Ceiling effect N (%)
Knowledge	10	2.7(2.2)	0 - 8	24(21.4)	0(0)
Attitude	10	5.4(2.6)	0 - 10	10(8.9)	10(8.9)
Behavior	9	10.7(4.0)	0 - 18	1(0.9)	6(5.3)
Confidence	6	6.4(3.7)	0 - 12	12(10.7)	10(8.9)

[a]SD , standard deviation, [b] N=number, (%)= percentage.

Table 3: Correlations between Knowledge, Attitude, Behavior, and Confidence.

Subscales	r[a]	Partial r[b]
Knowledge/Attitude	0.499	0.485
Knowledge/Behavior	0.155	0.112
Knowledge/Confidence	0.343	0.326
Attitude/Behavior	0.409	0.381
Attitude/Confidence	0.423	0.435
Behavior/Confidence	0.244	0.238

r^a = Spearman correlation coefficient; Partial r^b = Correlation coefficient adjusting for potential confounders which included sociodemographic characteristics.

This pattern reflects a discrepancy between awareness of EBD principles and the ability to apply them effectively in clinical and academic contexts.

The markedly insufficient level of knowledge among participants is concerning, particularly because postgraduate students are expected to be familiar with scientific literature and to apply evidence in advanced clinical decision-making. The presence of a significant floor effect in the knowledge domain further suggested that a substantial proportion of students possess very limited understanding of core EBD concepts. Similar findings have been reported among dental students and practitioners in Kuwait, Iran, and Malaysia, where insufficient knowledge was attributed to limited formal training in research methodology and biostatistics [1, 2, 9, 13]. This finding aligns with the Libyan context, where EBD is not taught as a standalone subject and is addressed only indirectly through research methods courses.

Differences in knowledge scores across postgraduate specialties, with relatively higher scores among students in pediatric dentistry, dental public health, and conservative dentistry, may reflect varying degrees of exposure to preventive, population-based, and research-oriented approaches within these disciplines. Previous studies have shown that specialties with stronger emphasis on prevention and public health tend to demonstrate higher engagement with evidence-based principles [7, 14].

Attitudes toward EBD were generally positive and consistent across most demographic groups, suggesting widespread acceptance of this approach as a valuable method in dental practice. These findings are consistent with reports from Europe and North America, where dental students have shown strong support for integrating EBD into their dental education despite their limited practical competence [5, 7, 15]. Importantly, students who attended additional courses in research methods or statistics exhibited significantly more positive attitudes, suggesting that structured educational exposure not only enhances knowledge but also fosters positive perceptions of EBD. This supports calls in the literature to move beyond passive learning environments toward active, skills-based teaching strategies [6, 16].

Regarding evidence-seeking behavior, participants demonstrated moderate use of information sources, with a clear preference for textbooks and general internet resources over high-level evidence sources such as the Cochrane Database and critically appraised topics. This pattern has been consistently reported in studies and is often attributed to issues of accessibility, time constraints, and limited training in efficient literature searching [5, 9, 17]. Although moderate behavioral scores suggest some engagement with evidence-seeking practices, the relatively low use of pooled evidence sources raises concerns about the quality of evidence underpinning clinical decisions.

Confidence in critical appraisal skills was also moderate, with low levels of confidence in identifying bias and evaluating study design. These findings are consistent with those reported by Hendricson et al. and subsequent validation studies using the KACE instrument, which confirmed that confidence in appraisal does not develop spontaneously and requires explicit training and repeated practice [10, 18]. The relatively higher confidence observed in participants without clinical experience may reflect an overestimation of their abilities, a phenomenon previously described in novice learners lacking practical experience [19].

Correlation analysis revealed meaningful relationships among EBD domains. Attitude showed strong correlations with knowledge, behavior, and confidence according to the thresholds used in this study, suggesting that positive perceptions of EBD may encourage engagement with evidence. Conversely, the weak correlation between knowledge and behavior indicates that knowledge alone is insufficient to change practice, underscoring the need for educational interventions that integrate knowledge acquisition with practical application, supervised literature searching, and clinical relevance [15,20].

Despite its strengths, including the use of a validated instrument and assessment of multiple EBD domains, this study has some limitations. The cross-sectional design does not permit causal inference, and the single-institution setting may limit generalizability. However, given that the University of Benghazi is a major provider of postgraduate dental training in Libya, the results offer valuable insights into the current state of preparedness of future specialist dentists for EBD.

These findings collectively reinforce the argument that the current educational approach is insufficient to bridge the gap between research evidence and clinical practice. Integrating structured, longitudinal, and competency-based training in EBD into undergraduate and postgraduate curricula is essential to equipping Libyan dentists with the skills necessary for lifelong learning and providing evidence-based healthcare.

4. Conclusions

Postgraduate dental students at the Faculty of Dentistry, University of Benghazi demonstrated positive attitudes toward EBD but showed low knowledge levels, moderate evidence-seeking behavior, and fair confidence in critical appraisal. These findings indicate a gap between awareness and effective implementation of EBD. Structured, competency-based EBD education should be integrated within undergraduate and postgraduate curricula to enhance evidence-based clinical practice, critical appraisal skills, and oral health care quality in Libya.

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Conflict of Interest

The authors declare no conflicts of interest. Funding: No external funding was received for this study.

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