

Original article

Knowledge, Attitudes, and Practices Regarding Professional Ethics Among Dentists in Benghazi, Libya: A Cross-Sectional Study of Associated Demographic and Professional Factors

Samiyah Abraheem^{1*} , Hassan Abdalla² ¹Department of Preventive and Community Dentistry, Faculty of Dentistry, Benghazi University, Benghazi, Libya.²Department of Restorative Dentistry, Faculty of Dentistry, Tobruk University, Tobruk, Libya.Email: om_ibraheem75@hotmail.com**Keywords:**

Professional ethics, Dental ethics, Knowledge, Attitudes, Practices, Dentists, Libya, Cross-sectional study.

ABSTRACT

Professional ethics is one of the major elements in the practice of dentistry and plays an important role in terms of safety and integrity of the profession. Nevertheless, there is limited literature on the knowledge, attitude, and ethical practices of dentists in Libya. This study sought to investigate the knowledge, attitude, and ethical practices among dentists working in Benghazi, Libya, and explore their relationships with certain demographic and professional factors. This study was a descriptive cross-sectional study carried out among 65 dentists in Benghazi, Libya. Data were collected through a structured, self-administered, online questionnaire comprising demographic characteristics, ethical knowledge, attitude towards professional ethics, and ethical practices. Descriptive statistics were performed, and relationships between categorical variables were analyzed using the Chi-Square test/Fisher's Exact test depending on the suitability of the data. The significance level was set at $P < 0.05$. Of all the dentists in the study, 47.7% showed good ethical knowledge, 38.5% had fair knowledge, and 13.8% showed poor knowledge. The majority of the participants had positive ethical attitudes (69.2%), whereas 24.6% had neutral attitudes, and 6.2% had negative attitudes. Regarding the practice aspect, 30.8% of the dentists showed proper ethical practices, 47.7% showed right practices, and 21.5% had wrong practices. Ethical knowledge, attitudes, and practices were significantly correlated with several demographic and professional factors, which include age, years of professional experience, educational qualifications, and previous participation in professional ethics workshops. The above results show that despite the fact that most of the dentists showed positive attitudes towards professional ethics, there are still some shortcomings in ethical knowledge and practice. Therefore, it is important to improve undergraduate ethics training as well as continue professional development among dentists in Libya. Multicenter studies should be conducted to confirm these results.

Introduction

Professional ethics forms one of the key cornerstones of healthcare practice and is highly important for delivering quality care, maintaining professionalism, and building trust. In dentistry, besides technical skills, ethical practice includes making ethical decisions, accountability, respect for patient autonomy, confidentiality, beneficence, non-maleficence, justice, truthfulness, and professionalism [1-3]. Adhering to ethical standards allows dentists to deliver patient-oriented care and comply with the expectations of professional bodies and society. The rapid development of new dental technologies, digital patient records, cosmetic dentistry, assisted diagnostics with the help of artificial intelligence, and minimally invasive treatment methods has posed many new ethical problems for modern dentists [3-9].

Dentists are now faced with the problem of how to solve ethical issues related to obtaining informed consent for new technologies, confidentiality and privacy of personal health information, transparency of algorithms used, conflict of interest management, influence of commercial interests on treatment decisions, disclosure of errors, and fair access to care. Professional international organizations, such as the American Dental Association and FDI World Dental Federation, stress that ethical decision-making must be incorporated in all facets of dental education and practice. Ethical guidelines of the two organizations largely follow the principles of autonomy, beneficence, non-maleficence, justice, veracity, and respect for the rights of patients. In addition, new guidance of FDI related to artificial intelligence in dentistry underscores the significance of transparency, accountability, data governance, oversight, and consent in clinical settings when using digital and AI solutions [4,9].

In spite of the universal significance of the issue of professional ethics, prior research revealed substantial differences in dentists' knowledge and attitudes towards ethics and ethical behavior between different countries [12-17]. It was found in surveys carried out in India, Saudi Arabia, Pakistan, Turkey, and elsewhere that, although dentists have rather positive attitudes to professional ethics, their knowledge of ethical standards is deficient, and so is the implementation of ethical

principles in their practice. Such factors as educational background, experience in professional activity, CPD, and ethics training were determined as crucial determinants of ethical awareness [14-17].

Currently, there is not much information available on the knowledge, attitude, and practice related to professional ethics of Libyan dentists. Up to now, little evidence is available that has investigated the ethical awareness of practising dentists, especially in Benghazi. Due to a lack of such information, the need for training programs on medical ethics cannot be identified, and evidence-based programs cannot be designed by dental schools, professional associations, and health authorities. Therefore, an investigation into the level of knowledge and professional behavior is essential to improve undergraduate training and professional development. The KAP survey is an effective tool for assessment of professional skills since it allows evaluation of all three components of professional ethics: knowledge, attitude, and practice at once. The study of all three components together can give an opportunity to understand if a positive attitude towards professional ethics is followed by positive behavior in practice. It is especially relevant nowadays when professional ethics competence should be developed with respect to issues of digital documentation, AI-based diagnostics, privacy of information, informed consent, and commercialization of dental aesthetics [6-11,18].

The conceptual framework of the current research supposes that demographic and professional variables such as age, gender, educational qualification, years of professional experience, and participation in ethics education can affect ethical knowledge of dentists. It is supposed that ethical knowledge influences ethical attitudes, which can reflect the ethical practice of professionals. The above-mentioned framework has been used for developing a questionnaire and conducting statistical analysis. The innovative nature of the current research is expressed in the fact that this study offers one of the first thorough assessments of knowledge, attitudes, and practice of dentists in terms of professional ethics in Benghazi, Libya. Moreover, besides the assessment of ethical awareness, this research reveals demographic and professional variables related to ethical competence and creates a basis for further educational planning.

Aim of the Work

The aim of the current study is an evaluation of knowledge, attitudes and practice regarding professional ethics of dentists practicing in Benghazi, Libya. It was supposed that dentists with higher educational qualification, professional experience and ethics education will have higher ethical knowledge, more positive attitudes and better ethical practice.

Materials And Methods

Study design and setting

This study is an observational cross-sectional study that was conducted among practicing dentists in Benghazi, Libya, to evaluate the Knowledge, Attitudes, and Practices (KAP) about professional ethics in dentistry. The paper was written according to the STROBE guidelines for cross-sectional studies. Data were collected from October to November 2023.

Study population and eligibility criteria

The target population consisted of licensed dentists working in governmental and private dental institutions in Benghazi, Libya. The inclusion criteria required participants to be licensed dental professionals, to be currently working as dentists in Benghazi, and to have responded to the online questionnaire voluntarily. Individuals who were undergraduate dental students, dental interns lacking their own professional license, retired dentists who no longer worked as dentists, and dentists working outside of Benghazi were not included.

Sample size and sampling technique

The study used a non-probability convenience sample. An initial target of at least 65 participants had been estimated using MedCalc software with parameters drawn from the KAP study by Parakh et al. [19]. Because that study addressed green dentistry rather than professional ethics, it was used only as a pragmatic KAP benchmark and not as a directly comparable ethics-specific prevalence estimate. In the absence of a prior Libyan study providing an ethics-specific effect estimate, the achieved sample of 65 dentists should be interpreted as an exploratory sample. Potential participants were recruited through professional contacts and online communication platforms, and the use of convenience sampling limits the generalizability of the findings.

Pilot study

Pilot testing was done before the actual survey among ten dentists in practice to gauge the clarity, relevancy, comprehensibility, and completion time of the questionnaire. Feedback was sought regarding the wording of the questions and their order. Minimal language changes were made to make the questions clearer without changing their meanings. Those dentists who participated in the pilot test were not included in the final analysis.

Questionnaire development and structure

The data collection was done through a structured self-administered questionnaire which was designed after an extensive review of the literature on the following concepts: dental ethics, professional ethics, informed consent, confidentiality, patient autonomy, and ethics decision making in clinical dentistry. The survey was made up of four different sections. The first section was about collecting demographic and professional information such as age, sex, educational qualification, workplace, years of professional experience, and whether the respondent had been involved in any ethics training before. The second section was about assessing knowledge on professional ethics, which included ethical principles, professional rules, disciplinary cases, and informed consent. The third section was about assessing attitude towards professional ethics using a three-point Likert scale of agreement, neutral, and disagreement.

Scoring system

Scores for knowledge, attitude, and practice were determined based on predetermined scoring criteria. In relation to knowledge, if an individual answered a question correctly, he would be credited with one mark; whereas if his answer was wrong or unsure, zero marks would be given. Scores for knowledge were classified into good, fair, and poor depending on the percent score out of total marks. Responses to attitude questions were scored using the three-point Likert scale and were classified into positive, neutral, and negative attitudes.

Data collection procedure

Data collection involved an online method using the SurveyMonkey tool. The link to the survey questionnaire was circulated via professional dental networks, social media sites, WhatsApp groups, and direct contact with practicing dentists. A total of 65 complete responses meeting the eligibility criteria were received and included in the analysis. Because the survey link was distributed through open professional networks and social-media channels, the exact number of dentists who received or viewed the invitation could not be reliably determined; therefore, a conventional response rate could not be calculated.

Ethical considerations

An introductory statement was provided along with the online questionnaire to inform participants about the purpose of the research, the voluntary nature of participation, confidentiality, anonymity, and freedom to withdraw at any point without repercussions. Ethical approval was obtained from the Research Ethics Committee of Benghazi University, before data collection. Electronic informed consent was obtained before completion of the questionnaire by selecting "Yes, I agree to participate." No personally identifiable information was collected.

Statistical analysis

The datasets used for the analysis were input, coded, and analyzed using IBM SPSS Statistics version 26.0 (IBM Corp., Armonk, NY, USA). For categorical variables, the measures of central tendency were presented in frequency and percentage form. Relationships among demographic and professional factors and KAP domains were analyzed using Pearson's Chi-square test. Fisher's Exact Test was utilized in case the number of participants in each cell category was lower than five. All statistical tests were done using a two-tailed approach, and a P value of <0.05 was taken to be statistically significant. P values and corresponding Chi-square values are provided along with frequencies and percentages.

Reporting quality and analytical transparency

It was intended to conduct exploratory univariable analysis in order to establish any association between characteristics of participants and KAP domains. The lack of enough observations for multivariable regression due to small sample size led to the fact that such analysis was not conducted. It should be taken into account while interpreting the results and drawing conclusions about causation.

Results

Particulars of participants. A total of 65 dentists made up the sample size used for the final analysis. The demographic and professional characteristics of the participants are presented in Table 1. Dentists from different age groups and varying levels of experience participated in the study, with the highest age group consisting of those who were between the ages of 30 and 40 (32.3%). Professional experience was equally divided among the three categories of experience, while males made up the majority of the participants (70.8%).

Overall ethical knowledge, attitudes, and practices. The overall distribution of knowledge, attitudes, and practices related to ethical issues is provided in Table 2 below. Good ethical knowledge was found among 31 of 65 dentists (47.7%; 95% CI: 36.0-59.6), while 25 dentists (38.5%) demonstrated fair ethical knowledge and nine dentists (13.8%) demonstrated poor ethical knowledge. A positive attitude toward ethical issues was found among 45 dentists (69.2%; 95% CI: 57.2-79.1). Right and complete ethical practice was found among 20 dentists (30.8%; 95% CI: 20.9-42.8), while wrong ethical practice was found among 14 dentists (21.5%; 95% CI: 13.3-33.0).

Table 1. Demographic and professional characteristics of participating dentists (n = 65)

Variables	Number	Percent
Age in years		
< 30	16	24.6
30 - 40	21	32.3
40 - 50	15	23.1
> 50	13	20.0
Years of experience		
< 5 years	22	33.8
5 - 10 years	22	33.8
> 10 years	21	32.3
Gender		
Male	46	70.8
Female	19	29.2
Qualification		
Bachelor's	30	46.2
Diploma	16	24.6
Master's	14	21.5
Doctorate	5	7.7
Participated in a professional ethics workshop or seminar		
Yes	26	40.0
No	39	60.0

Table 2. Distribution of participants according to knowledge, attitudes, and practices regarding professional ethics

Items	Number of participants	Percent of participants
Knowledge		
Good	31	47.7
Fair	25	38.5
Poor	9	13.8
Attitude		
Positive	45	69.2
Neutral	16	24.6
Negative	4	6.2
Practice		
Right and complete	20	30.8
Right	31	47.7
Wrong	14	21.5
Total	65	100.0

Variables related to ethical knowledge. In order to establish the variables related to ethical knowledge, demographic and professional variables were analyzed between different groups of knowledge (Table 3). Differences in ethical knowledge were found according to age ($\chi^2 = 14.36$, $P = 0.025$, Cramer's $V = 0.33$), years of professional experience ($\chi^2 = 18.33$, $P = 0.001$, Cramer's $V = 0.38$), gender ($\chi^2 = 12.05$, $P = 0.002$, Cramer's $V = 0.43$), qualification ($\chi^2 = 34.33$, $P = 0.001$, Cramer's $V = 0.51$) and participation in previous ethics workshop ($\chi^2 = 40.83$, $P = 0.001$, Cramer's $V = 0.79$). Of these variables, the most related was participation in the previous ethics workshop, followed by educational qualification.

Variables related to ethical attitudes. The relationship between demographic variables and ethical attitudes is given in Table 4. Level of ethical attitude showed statistically significant association with age ($\chi^2 = 20.27$, $P = 0.002$, Cramer's $V = 0.39$), years of professional experience ($\chi^2 = 19.32$, $P = 0.001$, Cramer's $V = 0.39$), gender ($\chi^2 = 17.08$, $P = 0.001$, Cramer's $V = 0.51$), qualification ($\chi^2 = 18.66$, $P = 0.004$, Cramer's $V = 0.38$), and participation in an ethics workshop ($\chi^2 = 11.04$, $P = 0.004$, Cramer's $V = 0.41$). Positive attitudes were more common among those who had more professional experience and had attended ethics workshops. As these are univariable analyses, these relationships must not be considered independent variables.

Table 3. Association between demographic and professional characteristics and knowledge level regarding professional ethics

	Knowledge						Total	X2 test P value
	Good “n=31”		Fair “n=25”		Poor “n=9”			
	No.	%	No.	%	No.	%		
Age in years								
< 30	3	9.7	12	48.0	1	11.1	16	14.36 0.025*
30 - 40	11	35.5	5	20.0	5	55.6	21	
40 - 50	10	32.3	4	16.0	1	11.1	15	
> 50	7	22.6	4	16.0	2	22.2	13	
Years of experience								
< 5 years	4	12.9	12	48.0	6	66.7	22	18.33 0.001*
5 - 10 years	10	32.3	10	40.0	2	22.2	22	
> 10 years	17	54.8	3	12.0	1	11.1	21	
Gender								
Male	25	80.6	19	76.0	2	22.2	46	12.046 0.002*
Female	6	19.4	6	24.0	7	77.8	19	
Qualification								
Bachelor's	2	6.5	20	80.0	8	88.9	30	34.33 0.001*
Diploma	11	35.5	4	16.0	1	11.1	16	
Master's	13	41.9	1	4.0	0	0.0	14	
Doctorate	5	16.1	0	0.0	0	0.0	5	
Participated in a professional ethics workshop or seminar								
Yes	25	80.6	1	4.0	0	0.0	26	40.83 0.001*
No	6	19.4	24	96.0	9	100.0	39	

χ^2 = Chi-square test. $P < 0.05$ was considered statistically significant. *Statistically significant association.

Table 4. Association between demographic and professional characteristics and ethical attitude level

Variables	Attitude						Total	X ² test P value
	Positive “n=45”		Neutral “n=16”		Negative “n=4”			
	No.	%	No.	%	No.	%		
Age in years								
< 30	6	13.3	6	37.5	4	100.0	16	20.271 0.002*
30 - 40	14	31.1	7	43.8	0	0.0	21	
40 - 50	13	28.9	2	12.5	0	0.0	15	
> 50	12	26.7	1	6.3	0	0.0	13	
Years of experience								
< 5 years	8	17.8	10	62.5	4	100.0	22	19.317 0.001*
5 - 10 years	18	40.0	4	25.0	0	0.0	22	
> 10 years	19	42.2	2	12.5	0	0.0	21	
Gender								
Male	38	84.4	8	50.0	0	0.0	46	17.08 0.001*
Female	7	15.6	8	50.0	4	100.0	19	
Qualification								
Bachelor's	14	31.1	14	87.5	2	50.0	30	18.66 0.004*
Diploma	12	26.7	2	12.5	2	50.0	16	
Master's	14	31.1	0	0.0	0	0.0	14	
Doctorate	5	11.1	0	0.0	0	0.0	5	
Participated in a professional ethics workshop or seminar								
Yes	24	53.3	2	12.5	0	0.0	26	11.04 0.004*
No	21	46.7	14	87.5	4	100.0	39	

χ^2 = Chi-square test. $P < 0.05$ was considered statistically significant. *Statistically significant association.

Demographic and professional factors that influence ethical practice. Table 5 below shows the link between demographic and professional variables and ethical practice. Age ($\chi^2 = 23.11$, $P = 0.001$, Cramer's $V = 0.42$), number of years of experience ($\chi^2 = 27.74$, $P = 0.001$, Cramer's $V = 0.46$), qualification ($\chi^2 = 20.12$, $P = 0.002$, Cramer's $V = 0.39$), and participation in past ethics workshops ($\chi^2 = 44.84$, $P = 0.001$, Cramer's $V = 0.83$) were significantly associated with ethical practice while gender ($\chi^2 = 1.93$, $P = 0.381$, Cramer's $V = 0.17$) was not significantly associated with ethical practice.

Table 5. Association between demographic and professional characteristics and ethical practice level

Variables	Practice						Total	X ² test P value
	Right and complete “n=20”		Right “n=31”		Wrong “n=14”			
	No.	%	No.	%	No.	%		
Age in years								
< 30	3	15.0	2	6.5	11	78.6	16	23.11 0.001*
30 - 40	2	10.0	16	51.6	3	21.4	21	
40 - 50	5	25.0	10	32.3	0	0.0	15	
> 50	10	50.0	3	9.7	0	0.0	13	
Years of experience								
< 5 years	3	15.0	7	22.6	12	85.7	22	27.744 0.001*
5 - 10 years	5	25.0	15	48.4	2	14.3	22	
> 10 years	12	60.0	9	29.0	0	0.0	21	
Gender								
Male	14	70.0	24	77.4	8	57.1	46	1.925 0.381
Female	6	30.0	7	22.6	6	42.9	19	
Qualification								
Bachelor's	4	20.0	15	48.4	11	78.6	30	20.121 0.002*
Diploma	6	30.0	9	29.0	1	7.1	16	
Master's	5	25.0	7	22.6	2	14.3	14	
Doctorate	5	25.0	0	0.0	0	0.0	5	
Participated in a professional ethics workshop or seminar								
Yes	20	100.0	6	19.4	0	0.0	26	44.838
No	0	0.0	25	80.6	14	100.0	39	0.001*

χ^2 = Chi-square test. $P < 0.05$ was considered statistically significant. *Statistically significant association.

Relationship among knowledge, attitudes, and practice. Knowledge of ethics was found to be highly correlated with attitude and practice of ethics (Table 6). Those who had adequate knowledge of ethics were inclined to have good attitudes and either correct or correct and complete ethical practice. Effect sizes for the correlation between knowledge and attitude and knowledge and practice were found to be large, as seen from $\chi^2 = 40.01$, $P = 0.001$, Cramer's $V = 0.56$ and $\chi^2 = 45.09$, $P = 0.001$, Cramer's $V = 0.59$, respectively.

Table 6. Association between ethical knowledge and both ethical attitude and ethical practice.

Variables	Knowledge						Total	X ² test P value
	Good “n=31”		Fair “n=25”		Poor “n=9”			
	No.	%	No.	%	No.	%		
Attitude								
Positive	29	93.5	13	52.0	3	33.3	45	40.01 0.001*
Neutral	2	6.5	12	48.0	2	22.2	16	
Negative	0	0.0	0	0.0	4	44.4	4	
Practice								
Right and complete	18	58.1	2	8.0	0	0.0	20	45.09 0.001*
Right	13	41.9	17	68.0	1	11.1	31	
Wrong	0	0.0	6	24.0	8	88.9	14	

χ^2 = Chi-square test. $P < 0.05$ was considered statistically significant. *Statistically significant association.

Ethical attitude and ethical behavior relationship. A significant relationship existed between the ethical attitude and the ethical behavior of individuals (Table 7). People with positive ethical attitudes had higher chances of showing right ethical practices, while those with negative attitudes always showed wrong ethical practices. There was a large effect size for this relationship ($\chi^2 = 28.21$, $P = 0.001$, Cramer's $V = 0.47$), thus indicating the internal consistency of the KAP pattern in this research.

Table 7. Association between ethical attitude and ethical practice

Ethical practice	Ethical attitude						Total	X ² test P value
	Positive “n=45”		Neutral “n=16”		Negative “n=4”			
	No.	%	No.	%	No.	%		
Right and complete	20	44.4	0	0.0	0	0.0	20	28.210 0.001*
Right	21	46.7	10	62.5	0	0.0	31	
Wrong	4	8.9	6	37.5	4	100.0	14	

χ^2 = Chi-square test. $P < 0.05$ was considered statistically significant. *Statistically significant association.

Discussion

The aim of this research work was to evaluate the level of knowledge, attitudes, and practices of the dentists about professional ethics in Benghazi, Libya, and their relation to the demographics and professional characteristics of the dentists. The most important finding of the study is the existence of a knowledge-attitude-practice discrepancy. Less than half of the dentists in the study had good knowledge of ethical principles (47.7%). Almost seven out of ten dentists have positive attitudes toward ethics (69.2%). However, only 30.8% had appropriate ethical practice. Thus, it can be concluded from the findings of this study that even if the attitudes towards professional ethics are positive, ethical conduct does not necessarily follow.

This difference between positive attitudes towards ethics and the implementation of such attitudes has turned out to be the most important finding of the current study. It implies that the mere awareness of ethical norms may not be enough without any additional support and experience in solving actual clinical ethical problems. There have been similar discrepancies between attitudes towards ethics and the ethical conduct of practitioners found among dentists and postgraduate students in various studies, where positive attitudes did not go hand in hand with sufficient knowledge and ethical conduct [12,14-16].

The extent of knowledge on ethics is fairly consistent with the results obtained in other similar KAP surveys carried out in Indian, Pakistani and Saudi dentists, with varying degrees of deficiency in knowledge on professional codes of conduct, informed consent, patient confidentiality and ethical decision-making [12,14-16]. Deficiencies in knowledge of dental ethics and jurisprudence have been documented by Muralidharan et al., while Irfan et al. found that attitudes towards ethics were more positive compared to factual knowledge of ethics in dental graduates [14,15]. This indicates that the issue of inadequate ethical competency could be a consistent problem in dental education, especially where ethics in dentistry is not integrated as a competency throughout the education process.

In this current research, there was a relationship between ethical knowledge and attitudes, which is influenced by age, years of professional experience, educational qualification, gender, and past participation in professional ethics workshops. There was also a relationship between ethical practice, age, experience, qualification, and ethics workshop

attendance, while there was no relation to gender. This relationship must be seen only as an association and not a predictor since the analysis was univariable. The relationship between experience and ethical competence could be due to exposure to clinical complexity and communication problems with patients, informed consent procedures, adverse event reporting, and professional accountability issues. These explanations have been given in previous research, which revealed more ethical awareness among senior clinicians and postgraduate dental practitioners [15,16,20]. These observed gender differences in ethical knowledge and attitude must be taken with caution as they might be due to differential experiences and education levels of the participants rather than true gender-based differences in ethical competency. The key point is that there was no significant association found between gender and ethical conduct among the participants. Further research is required using a larger sample size and an equal gender ratio in order to address the confounding factors.

Professional ethics training workshops correlated significantly with ethical knowledge and practice of dentists. This result proves the significance of continuing professional education as a way of enhancing ethical competence among professionals. With respect to adult learning theory, it can be said that the results are consistent with the notion that the competence of professionals can be enhanced with theoretical knowledge followed by experiential learning. The training programs for ethics should consist of such activities as discussions of cases, role-playing, reflection, exercises on informed consent, confidentiality, error disclosure, etc.

The significance of ethics training has grown even more with the emergence of digital dentistry, electronic medical record keeping, artificial intelligence-based diagnosis, aesthetic dentistry, and treatment through commercial motives. Such advances give rise to several ethical concerns, including the issue of data privacy, algorithm transparency, informed consent regarding AI-driven procedures, liability concerning automation of clinical decisions, marketing of cosmetic procedures, and danger of overtreatment [3-11,18]. Thus, modern ethics teaching in dentistry must cover not only traditional values like autonomy, beneficence, non-maleficence, justice, confidentiality, and veracity but also issues pertaining to digital technologies and AI-based practice.

In terms of clinical practice, the results highlight the importance of applying one's ethical consciousness to professional practice. Improving the ethical performance of dental care providers could positively impact the degree of patient trust, enhance patient-centered practice, decrease medico-legal claims, and ensure better quality and safety of dental services. From an educational perspective, the Libyan dental schools could consider adopting professional ethics as a competency-based long-term curriculum, not only an academic topic. From a policy perspective, the professional regulatory bodies and the Libyan dental organizations might think about making ethics training part of the requirements for renewing their license and obtaining mandatory continuing education credits. Development of national guidelines for ethical practice, standardizing the informed consent process, and implementing competency-based tools for assessment of ethical knowledge and skills would certainly help to improve the standards of ethical performance in both governmental and private dental services.

Strengths and limitations

One of the important strengths of this study is that it establishes a baseline for ethical knowledge, attitude, and behavior amongst dentists in Benghazi, where information in the literature is limited. In addition to studying various demographics and characteristics of the dentists, the relationship between knowledge, attitude, and behavior was also examined in this study. However, there are certain weaknesses associated with this study that need to be pointed out. The small sample size and the fact that it was based on convenience sampling are one such limitation. Another problem is that the Internet-based survey is prone to selection bias and social desirability bias because the dentists could overstate their ethical behavior.

Future research

Further research could involve a larger number of multi-center participants from various parts of Libya and, where possible, a probability sampling method. Multi-variable models could be used in order to identify predictors of ethical knowledge, attitude, and practice. Moreover, intervention research should be conducted in order to determine whether ethics education, simulation-based learning, and continuous professional development result in improvement in ethical decision-making and conduct. In summary, this study reveals that although dentists from Benghazi demonstrated a positive attitude towards professional ethics, considerable deficits existed in terms of ethical knowledge and practice. Therefore, there is an urgent need for improving ethics education in order to ensure ethical conduct and decision-making and, thus, improve the quality of dental care in Libya.

Conclusion

This cross-sectional study presents baseline data about the knowledge, attitude, and practice of ethics in Benghazi dentists. While the vast majority of respondents had positive attitudes towards professional ethics, less than half possessed sufficient knowledge of professional ethics, and an even smaller proportion had proper and comprehensive practice of professional ethics. The variables that were associated with higher ethical knowledge and proper practice of professional ethics included a higher level of educational qualification, longer years of practice, and prior attendance of

ethics education programs. The results of this study emphasize the necessity of reinforcing ethics education not only during the period of undergraduate dental training but also in postgraduate programs that will further develop the knowledge of ethics in practicing dentists. Due to the cross-sectional design of the research, the relationships observed should be considered associations rather than causal relationships. Further multicenter research with more representative samples is needed to validate these results.

Recommendations

Ethics in dentistry should be embedded as a longitudinal, competency-based component within undergraduate curricula, rather than being confined to standalone theoretical lectures. For practicing dentists, continuing education workshops on ethical practice must be made mandatory, with particular emphasis on informed consent, confidentiality, error disclosure, patient autonomy, professional responsibility, digital record management, and the ethical implications of artificial intelligence. Regular assessment of ethics competence should be conducted by dental schools and professional boards using appropriate evaluative methods. Ethics training itself must be experiential, incorporating clinical cases, simulations, reflection exercises, and multidisciplinary seminars to foster practical decision-making skills. Finally, future research should adopt robust methodological designs—specifically multicomplexity frameworks, probability sampling, and longitudinal or interventional approaches—to determine whether ethics education exerts measurable effects on ethical decision-making and professional practice over time.

Clinical Significance

A gap was found between dentists' positive attitudes towards ethics and its actual implementation among them in Benghazi. It is recommended that structured ethics education and training be encouraged to improve ethics-based decision-making and the quality of care.

Data Availability

The datasets generated and analyzed during the current study are available from the corresponding author upon reasonable request.

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Conflict Of Interest

The authors declare that they have no competing interests. Ethical approval was obtained from the Research Ethics Committee of Benghazi University in February 2023, before data collection. Electronic informed consent was obtained from all participants before completing the questionnaire. Participants were informed that participation was voluntary, anonymous, and confidential.

Author Contributions

SAM conceived the study, contributed to questionnaire development, coordinated data collection, performed data analysis, and drafted the manuscript. HAH contributed to study design, interpretation of findings, critical revision of the manuscript, and approval of the final version.

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