

Cross-Sectional Study

Evaluation of the Attitude, Knowledge, and Ability of Specialized Dental Assistants in the Field of Vital Statistics Application

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ABSTRACT

For the optimal use of scientific texts and new materials, an optimal level of skill and experience in reading, evaluating, analyzing data, and interpreting the findings of valid studies is needed. The present study was conducted to investigate the knowledge of dental students in the field of evaluation, data analysis, and interpretation of the findings of evidence-based studies. This cross-sectional study was conducted on working dental assistants. The study tool was a questionnaire including four parts the participants' personal information, their attitude towards statistics, their ability to use the results of articles, and the knowledge part. The data were analyzed with the help of SPSS23 software and an independent t-test at a significance level of 0.05. This study was conducted on a total of 62 people, of which 42 were women. 14 people participated in research methods, statistics, and epidemiology workshops. The average attitude score of the students was 20.4 ± 2.9 out of 30 and the average ability score was 8.4 ± 3.1 out of 20. The frequency of correct answers to knowledge questions was 36.4% and there was no correlation between students' knowledge in the field of statistics with gender and attendance at the workshop on statistics and research methods. Based on the results of this study, the level of specialized dental students in the field of knowledge of methods and interpretation of statistical analyses was low; therefore, to increase the level of ability and knowledge of students in the field of statistics, it is suggested to change the curriculum and revise the teaching methods.

Keywords: Dental assistants, Vital statistics, Knowledge, Analyzing data

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Introduction

Currently, there is a lot of emphasis on evidence-based care and treatment, and clinical researchers are faced with a large number of articles in the field of clinical issues such as the evaluation of treatment methods, factors affecting the prognosis of treatment, and the causes of disease. It is necessary for dentists, like other people working in the medical profession, to use the highest level of evidence available for their clinical questions [1-4].

In most articles, statistical tests are used to estimate and generalize the results. A study in 1985 in the review of prominent journals in the field of general medicine showed that analytical statistics methods were used in

42% of 760 review articles [5]. Therefore, to understand the articles and draw appropriate conclusions from their findings, an optimal level of skill and experience is needed in reading, evaluating, analyzing information, and interpreting the findings [6-8].

In addition, for the critical study of medical articles, it is necessary to understand statistical tests. In general, statistics and epidemiology are the foundation of evidence-based medicine, and if students are not well acquainted with the content of these courses, they cannot use the new knowledge after graduation. In studies conducted on medical and dental students in Scotland, America, and France, it has been observed

that their knowledge in the field of vital statistics and epidemiology was at a low level [9-14]. In the studies conducted to investigate the statistical understanding and interpretation of research results in specialized students in Europe and America, the students did not have enough information to investigate and understand statistical methods [15-20].

In studies conducted in developing countries such as Nigeria, India, Saudi Arabia, and Pakistan, students' knowledge of statistics was not enough [21-27]. Considering that all the countries of the world have had a growing trend in terms of science and the production of articles in recent years, this study was conducted to examine the knowledge of dental students in the field of statistics and epidemiology so that, if necessary, special plans can be made in to improve their capabilities.

Materials and Methods

This cross-sectional descriptive study was conducted on specialized dental assistants. The data collection tool was a standard questionnaire taken from the article by Polychronopoulou *et al.* [16]. Its face validity was confirmed by two experts in epidemiology and biostatistics. The reliability of ability and attitude was measured using Cronbach's alpha test and the alpha value was 70%.

The designed questionnaire included four main parts the participants' personal information, their attitude towards statistics, their ability to use the results of the articles, and the knowledge part. The first part included personal characteristics (age and sex), educational level, and previous courses in research methods, statistics, and epidemiology. The second part, on a 5-point scale, from completely disagree to agree, was

about students' attitudes toward statistics and epidemiology and their application in using the results of the articles. The third part was scored on the respondents' ability to apply statistical and epidemiology knowledge on a 5-point scale from lack of ability to complete ability. The last part included questions about different statistical topics in different cases of research in the field of dentistry.

The method of data collection was coordinated with the specialized training officer of each group. The questionnaires were handed over to the specialized assistants and in the presence of the responsible person, the dental assistants answered the questions. Incomplete questionnaires were excluded from the study.

Data description was done using frequency distribution tables and mean and standard deviation indices. Independent t-test was used to compare between groups due to the normality of quantitative variables. The software used was SPSS23 and the significance level was considered 0.05.

Results and Discussion

Out of a total of 96 specialized dental assistants, 62 (65%) participated in the study. 42 people (66.7%) were female. In other words, two-thirds of the participants were women and the rest were men. The age range of the students under study was 24 to 40 years and their average age was 27.8 ± 2.9 years. Most of the participants (45 people, 72.6%) had not completed the course of research methods, statistics, and epidemiology, and half of them were studying in the first and second year of the specialized level (**Table 1**).

Table 1. Description of the characteristics of the subjects under study.

Characteristics	Group	N	%
Gender	Female	42	66.7
	Male	20	32.3
Age (years)	24-27	25	39.6
	28-40	26	41.4
Year of study at the university	First-year	34	54.8
	Other years	28	45.2
Specialized field	Restorative	6	9.7
	Children	6	9.7
	Radiology	4	6.5
	Endodontics	9	14.5
	Prosthesis	10	16.1
	Diagnosis	2	3.2

	Orthodontics	9	14.5
	Jaw surgery	5	8.1
Passing the training course in research methods, statistics, and epidemiology	Yes	14	22.6
	No	45	72.6

More than half of the participants wanted to learn more about biostatistics and epidemiology. 43 people (68.3%) of the participants used new scientific articles to find new perspectives in their specialized field, and most of the students (57 people, equal to 91.9%)

believed that to draw correct conclusions from the articles and Sources need to be somewhat familiar with the science of statistics. 42 people (67.8 %) wanted to use the results of new scientific articles to find new perspectives in their specialized field (**Table 2**).

Table 2. Participants' attitudes towards biostatistics and epidemiology.

Questions related to participants' attitudes	I agree or completely agree	
	N	%
I would like to learn more about biostatistics if the opportunity arises	40	64.5
I would like to learn more about epidemiology if I have the opportunity	37	59.7
I understand almost all the statistical terms I see in journals	8	12.9
I usually use the results of new scientific articles to make treatment decisions for patients	24	38.6
I usually use the results of new scientific articles to find new perspectives in a specialized field	42	67.8
To draw correct conclusions from articles and sources, I need to know some statistics	57	91.9

Out of 14 people (22.5%) who thought they could interpret the P-value, only one person answered the question related to the concept of P-value correctly.

Only two people (3.2%) stated that they could recognize the correct statistical method in the studies (**Table 3**).

Table 3. Frequency distribution of items related to participants' ability to use statistics and epidemiology in studies.

Cases	Capable and fully capable	
	N	%
Interpretation of the P value presented for the results of a study	14	22.5
Interpreting the results of a statistical method used in the study	10	16.1
Identifying that the correct statistical method has been used to answer the research question in the study	2	3.2
Identify the factors that affect the power of the study	3	4.8

The mean attitude score was 20.4 ± 2.9 , which was in the range of 11 and 27. The average ability score was 8.4 ± 3.1 . In the recognition section, the average percentage of correct answers was 36.4 with a 95% confidence interval (37.9 and 34.9). The participants

had the highest percentage of correct answers in identifying the types of variables (98.4%) and the lowest percentage in identifying the chi-square test (8.1%) and the conditions for using parametric tests and the concept of P-value (11.3%) (**Table 4**).

Table 4. The percentage of correct answers to the questions related to the participant's knowledge of statistical subjects.

Question number	Subject	Number of correct answers	Percentage of correct answers
1	Identification of continuous variable	61	98.4
2	Identifying the rank qualitative variable	12	19.4
3	Identification of nominal qualitative variable	41	66.1
4	Diagnosis of cross-sectional studies	38	61.3

5	Meta-analysis diagnosis	38	61.3
6	Identification of the purpose of randomization	21	33.9
7	Recognizing the concept of skewness	43	69.4
8	Interpretation of standard deviation	15	24.2
9	Diagnosing the purpose of conducting double-blind studies	12	19.4
10	Interpretation of the null hypothesis	35	56.5
11	Diagnosis of parametric methods	7	11.3
12	Interpretation of P value	7	11.3
13	Proportional Cox regression diagnosis	8	12.9
14	Identification of variance analysis	14	22.6
15	Identification of chi-square test	15	8.1
16	Identification of independent t-test	14	22.6
17	Interpreting the odds ratio and its confidence interval	27	43.5
18	Reliability indicators detection	8	12.9

The results of investigating the relationship between some factors related to students' attitudes, ability, and understanding of statistical concepts are shown in

Table 5. So attitude, ability, and knowledge had no significant relationship with gender, educational level, and completion of training course ($p > 0.05$).

Table 5. The relationship between some factors related to students' attitude, ability, and knowledge.

Variable		Attitude	p	Ability	p	Recognition	p
Gender	Female	20.2 \pm 3.1	0.4	8.4 \pm 2.9	0.9	6.5 \pm 2.4	0.7
	Male	20.8 \pm 2.7		8.3 \pm 3.7		6.7 \pm 2.2	
Year of study at the university	First-year	20.1 \pm 2.7	0.5	8.6 \pm 3.3	0.5	6.3 \pm 2.2	0.3
	Other years	20.7 \pm 3.2		8.0 \pm 2.9		6.9 \pm 2.5	
Completing the research method, statistics, and epidemiology training course	Yes	19.4 \pm 3.2	0.2	8.6 \pm 3.9	0.7	6.7 \pm 2.7	0.7
	No	20.6 \pm 2.8		8.4 \pm 3.0		6.4 \pm 2.3	

Dentists should have the ability to judge the quality of articles and have a clear understanding of the principles of statistics and epidemiology to apply the results of newly published research and improve their clinical practice. Butt and Khan in a critical review of more than 4000 research studies found that only 20% of them had correct design, data collection, and statistical methods [28]. In this cross-sectional study, 62 specialized dental assistants were studied to determine their attitude, ability, and knowledge of statistics and epidemiology. The average total recognition score of the studied samples was 6.5 ± 0.3 , which had a score between 0 and 18. The average percentage of correct answers was 36.4 with a 95% confidence interval (34.9 and 37.9), which is almost the same as the research by Windish *et al.* in 2007 in the United States of America (39.7 and 43.3) and Polychronopoulou *et al.* which took place in Europe (40.2 and 47.3) [16, 17].

In the present study, the lowest score was related to the identification of the chi-square test (8.1% of correct recognition) and the highest score was related to the

identification of the continuous variable (98.4%). In the study of Polychronopoulou *et al.* only 44.8% were able to identify the continuous variable [16]. In Windish's study, the best knowledge was related to the diagnosis of the purpose of the double-blind study (87.4%) and the lowest knowledge was related to the interpretation of Kaplan-Meier analyses (10.5%) [17]. In Polychronopoulou *et al.*'s study, the lowest score was related to identifying the appropriate use of the chi-square test (11.8%), which is consistent with the results of our research, and the highest score was related to knowing the purpose of a double-blind study [16].

In the current research, the level of attitude towards statistics was relatively moderate, but the knowledge and ability of the participants were low and weak. Only 22.6% of people had completed the research method, statistics, and epidemiology training course, and the knowledge and ability scores of the participants had no significant relationship with passing the statistics and epidemiology course. This finding was not consistent with the research results of Windish *et al.* in the United

States of America and Polychronopoulou *et al.* in Europe [16, 17]. In addition, in our study, the recognition score was not affected by the academic year, gender, or age. This finding was consistent with the study of Polychronopoulou *et al.* [16]. While in some studies, the recognition score was influenced by gender so in men, the average score was higher [17]. In this study, 64.5% of the participants wanted to know more about biostatistics, compared to the study by Windish *et al.* (77%) and the study by Polychronopoulou *et al.* (63%) [16, 17]. No significant relationship was observed between age groups and cognition scores in the above two studies.

In the present study, almost half of the students used the results of new scientific articles to make decisions about the treatment of patients. While only 3.2% of them could recognize that, the correct statistical method was used to answer the research question in the study. It should be noted that in this regard, it is necessary to have sufficient knowledge of statistics to decide choosing the appropriate treatment method. One of the weaknesses of this study was the non-participation of all specialist assistants in the research. Considering the low level of students' knowledge of statistics and epidemiology, it is necessary to use effective planning to increase their ability.

Conclusion

The present study was conducted to investigate the knowledge of dental students in the field of evaluation, data analysis, and interpretation of the findings of evidence-based studies. The average attitude score of the students was 20.4 ± 2.9 out of 30 and the average ability score was 8.4 ± 3.1 out of 20. The frequency of correct answers to knowledge questions was 36.4% and there was no correlation between students' knowledge in the field of statistics with gender and attendance at the workshop on statistics and research methods. Based on the results of this study, the level of specialized dental students in the field of knowledge of methods and interpretation of statistical analyses was low; therefore, to increase the level of ability and knowledge of students in the field of statistics, it is suggested to change the curriculum and revise the teaching methods.

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