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Elementary school staff knowledge and attitude with regard to first-aid management of dental trauma in Iran: a basic premise for developing future intervention

Maryam Raoof[1], Fatemeh Zaherara[2], Noushin Shokouhinejad[3], Sakineh Mohammadalizadeh[4]

[1]Oral and Dental Diseases Research Center/ Department of Endodontics, Kerman University of Medical Sciences, Kerman; [2]Oral and Dental Diseases Research Center, Kerman University of Medical Sciences, Kerman; [3]Department of Endodontics, School of Dentistry/Dental Research Center, Tehran University of Medical Sciences, and Iranian Center for Endodontic Research, Tehran; [4]Instructor of Medical University, Kerman, Iran

Correspondence to: Dr Maryam Raoof, Endodontic Department, School of Dentistry, Shafa Street, Jomhori Eslami Boulvard, Kerman, Iran
Tel.: +98 341 2443224
Fax: +98 341 2118073
e-mail: maryam.raoof@gmail.com

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Abstract – *Aim*: The purpose of this study was to evaluate Iranian teachers' knowledge and attitude with regard to emergency management of dental trauma. *Material and methods*: A four-part questionnaire, including demographic data, knowledge, attitude, and self-assessment, was given to 422 teachers from 14 schools. Data obtained from 400 completed questionnaires were statistically analyzed using *t*-test, one-way ANOVA and Pearson correlation coefficient. *Results*: It was found that there was no statistically significant difference between knowledge and demographic variations ($P > 0.05$). However, there was a moderate positive association between knowledge and attitude toward emergency management of dental trauma ($r = 0.38$, $P = 0.0001$). The outcome indicated completely inadequate knowledge regarding the management of tooth fracture and avulsion. Most participants (94.3%) were unsatisfied with their awareness and suggested that further education on the topic should be offered. *Conclusions*: The present study revealed considerably low knowledge of the participants regarding the first-aid management of dental trauma for the study group. As teachers get an opportunity to attend a case of dental trauma, strategies to improve the teachers' knowledge seem crucial.

Epidemiological studies show that traumatic dental injuries are emerging as public health concern in 10–35% of cases studied, causing major psycho-social and economic impact on lives (1). The consequences of dental trauma range from simple enamel fracture to more complicated tooth avulsion. Treatment strategies for all types of injured teeth should aim at determining the appropriate treatment as soon as possible for the achievement of a favorable prognosis. This is most urgent for avulsed permanent teeth as any delay in replantation dramatically reduces the long-term prognosis and leads to loss of traumatized teeth because of poor emergency management (2–4). For this reason, it is important to educate the public that may witness the accident of how to handle emergency procedures in different scenarios.

An accident because of a fall appears to be the most common cause of dental injuries. Schools are places where one can find a noticeable risk of traumatic injuries. Therefore, students are highly predisposed to traumatic events. School staff members are frequently in proximity to children and are often called upon to provide for initial emergency treatment (5, 6).

Multiple studies conducted in different regions of the world have reported that there is inadequate awareness regarding emergency measures for traumatized teeth (7–16). However, our research in the literature revealed that only one study has been carried out in Iran (14), on the mentioned topic. The purpose of the present study is to evaluate the knowledge and attitude of elementary school staff concerning dental trauma first-aid steps.

Material and methods

This cross-sectional survey was approved by the research ethics committee at Kerman University of Medical Sciences. The questionnaire for this study, except the attitude part, was a modified version of two previous similar studies (10, 13) and translated to Farsi. The authors designed the attitude part of the questionnaire,

and the items were constructed with the help of statistical consultant. It includes items related to demographics, knowledge, attitude, and self-assessment regarding emergency management of dental trauma (Appendix 1). For assessment of validity of our questionnaire, we used content validity. During this procedure, five endodontists made their comments on each question all of which were acceptable. The reliability of our survey instrument was determined by Cronbach's alpha (0.64 and 0.7 for attitude and knowledge, respectively) that indicates acceptable reliability.

A pilot study on 10 teachers was carried out to determine the sample size. The participants acquired 70.4% of total attitude score and 50% of knowledge score. On this regard, the maximum sample size for $\alpha = 0.05$ and $\rho = 0.1$ was calculated as 400.

The questionnaire was personally distributed to 422 elementary school staff who agreed to take part in the survey. The participants were randomly selected from 14 schools in Kerman city, the capital of Kerman province that is the largest one in Iran. This city is located 1076 km south of Tehran, capital of Iran. The forms were completed and collected in one visit.

We used measures of central tendency and dispersion for data description and t-test, one-way ANOVA plus Pearson correlation coefficients by means of SPSS 11.5 (SPSS; IBM, Chicago, Ill, USA) for data analysis. A value of $P \leq 0.05$ was considered to be significant. Responses to part III and IV of the questionnaire contributed to our finding as descriptive information. Some questions had more than one correct answer.

Results

The survey achieved a 94.7% response rate. A total of 400 completely filled out questionnaires were evaluated. Twenty-two of them were excluded because of missing answers.

Part I: Demographic section

Among the participants, 318 (79.5%) were women. 47.2% of the participants had experienced some sort of dental trauma. Out of the study population, 209 (52.3%) had no first-aid training. The results demonstrated that only 9.5% of student supervisors had formal dental trauma emergency training. 42% had minimal fragmentary knowledge in dental traumatology through studying magazines, books, or by means of watching TV. The frequency of answers to part I of the questionnaire is summarized in Table 1.

In this study, one-way analysis of variance and t-tests did not show any statistically significant difference between knowledge and demographic variations or work experiences ($P > 0.05$).

Table 1. Responses to part 1: Demographics of study population

Characteristic	*n* (%)
Gender	
Female	318 (79.5)
Male	82 (20.5)
Age	
≤35	120 (30)
36–45	200 (50)
>45	80 (20)
Education	
Diploma	120 (30)
Associate degree	166 (41.5)
Bachelor	109 (27.3)
Masters	5 (1.3)
Position held	
Educational	318 (79.5)
Health teacher	16 (4)
Physical education teacher	17 (4.3)
Administrative	49 (12.2)
Received first-aid training	
Yes	191 (47.7)
No	209 (52.3)
Dental trauma experience around	
Yes	189 (47.2)
No	211 (52.8)

Part II: Attitude section

Table 2 summarizes the responses to attitude questions. About 55.5% of the respondents remarked that teachers are responsible for the provision of emergency care to the dental trauma suffered by the students at schools. Regarding the effect of time on long-term prognosis, 85.7% believed time is not an important effective factor. Only 7% believed that first-aid training, including dental emergency management, must be one of the priorities in teachers' educational programs, while 9.8% of the population was aware of the important role of the teacher in improving the prognosis. Approximately 70.5% had a negative attitude toward wearing a mouth guard in contact sports.

The attitude section was composed of 10 questions, with five possible answers for each one. So the total scores in their section ranged from 10 to 50. In this study, the mean score for attitude was 36.4 with a standard deviation of 5.01. One-way analysis of variance and t-tests were used to test differences in the score of the study participants' attitude across demographic characteristics and work experiences. We observed a significant difference only between having participated in first-aid programs and attitude scores (teachers who were trained in first aid, presented a more positive attitude). The Pearson correlation coefficient showed that there was a moderate positive association between knowledge and attitude toward emergency management of dental trauma ($r = 0.38$, $P = 0.0001$).

Part III: Knowledge section

Case I: Crown fracture

Table 3 summarizes the responses to questions regarding crown fracture. Among the 400 subjects, only 156 (39%) knew that the damaged tooth was permanent. As an immediate action, 12% of them said that they would re-assure the child and return him to class. Of all respondents, 51.5% said that they would contact the

Table 2. Responses to part II: Attitude questions

	Choice											
	Strongly agree		Agree		Neither agree nor disagree		Disagree		Strongly disagree			
Question	No.	Percent	No.	Percent	No.	Percent	No.	Percent	No.	Percent	Mean	Standard deviation
Question 1	39	9.8	64	16	75	18.8	170	42.5	52	13	3.33	1.18
Question 2	149	37.3	191	47.8	34	8.5	23	5.8	3	8	4.15	0.86
Question 3	24	6	84	21	64	16	154	38.5	74	18.5	3.42	1.18
Question 4	144	36	177	44.3	62	15.5	16	4	1	0.3	4.12	0.83
Question 5	32	8	48	12	60	15	188	47	72	18	3.55	1.15
Question 6	125	31.3	181	45.3	55	13.8	34	8.5	5	1.3	3.97	0.95
Question 7	59	14.8	126	31.5	78	19.5	118	29.5	19	4.8	2.78	1.16
Question 8	98	24.5	188	47	70	17.5	38	9.5	6	1.5	3.83	0.95
Question 9	24	6	106	26.5	93	23.3	134	33.5	43	10.8	3.16	1.12
Question 10	142	35.5	179	44.8	62	15.5	12	3	5	1.3	4.10	0.86

Table 3. Frequency of answers relative to crown fracture ($n = 400$)

Questions	Answers	*n* (%)	95% CI
Q1. Kind of the traumatized tooth	***Permanent***	156 (39)	34.2–43.8
	Temporary	124 (31)	26.5–35.5
	Don't know	120 (30)	25.5–34.5
Q2. Emergency management	Calm down the child	48 (12)	8.8–15.2
	Contact parents	206 (51.5)	46.6–56.4
	Look for the piece	136 (34)	29.4–38.6
	Don't know	54 (13.5)	10.2–16.8

child's parents to get him/her to a dentist. Only 34% responded that they would keep the fractured piece, while 13.5% did not know what to do.

Case II: Permanent tooth avulsion

Table 4 summarizes the responses to questions regarding tooth avulsion. Of all those surveyed, only 13% selected the response 'find the tooth, wash it, and put it back in its place in the mouth'. Only 23% said that they would put the tooth in the patient's mouth before referring to the dentist. Unfortunately, the majority responded incorrectly by stopping the oral bleeding or by putting the tooth in paper. In relation to seeking treatment by phone, only 1.8% reported that they would consult an endodontist. When questioned regarding the need for tetanus vaccine, 60.8% gave a correct positive answer. Among the 400 respondents, 30.3% did not know that they could replant the tooth after dental avulsion when it has fallen out. Almost 38% responded correctly by washing the tooth with water before replantation. The results for the question 'If you didn't replant the tooth, how would you transport it to the dentist?', only 16% answered that they would put it back in the patient's mouth, while 42% suggested that they would carry it in paper. In the case of transporting a tooth in a liquid, respondents would transport the tooth in tap water (21%), milk (13%), saliva of the child (19.5%), alcohol (13.5%), normal saline solution (23.5%), and antiseptic solution (23.6%). Of all those participating in the study, only 38.5% knew the urgency in seeking professional help immediately.

Part IV: Self-assessment section

Most teachers (94.3%) were unsatisfied with their level of knowledge. About 70.7% wanted further education on the topic. Only 29.3% stated that they were able to take proper action in cases of trauma.

Discussion

According to the results of the present study, 52.3% of teachers did not have any first-aid training. This finding is consistent with two other previously published studies in countries other than Iran in which most of the primary school teachers reported that they received no advice regarding traumatic dental injuries (8, 10, 12, 13). It is worth noting that 47.2% of teachers have experienced a kind of dental trauma. This finding reinforces the need for teachers to be well informed in dental emergency management. An even more disturbing fact is that the knowledge of physical education trainers was not different from others. It seems that physical education teachers may be more frequently exposed to traumatic injuries, so they are expected to be more professional in managing such events. About 54% did not know where the nearest available dental emergency services were located. This is in a line with the findings of studies from Singapore and Jordan (8, 16). As delay in emergency treatment dramatically reduces the long-term prognosis, especially in avulsed cases (2–4), when there is nobody present to provide emergency procedures, patients are expected to experience delays because of traffic congestion and long distance. For fast access to health advice, it seems that it is better to know where the nearest dental emergency services are.

There was not a statistically significant difference between the knowledge level of participants who had formal first-aid training at least once in their career and those who did not. This suggests future dental emergency education efforts should be directed toward continuing educational programs and updating the certificates of school staff who often assist children under scenarios where traumatic dental injuries are likely to occur.

Most of the participants felt they were responsible for the management of dental traumatic injuries in school. They believed they could improve the prognosis by early

Table 4. Frequency of answers relative to avulsion (n = 400)

Questions	Answers	*n* (%)	95% CI
Q1. Emergency management	Bleeding control	220 (55)	50.1–59.9
	Replantation	52 (13)	9.7–16.3
	Save the tooth in saliva& look for professional help	92 (23)	18.9–27.1
	Place the tooth in paper	60 (15)	11.5–18.5
	Don't know	36 (9)	6.2–11.8
Q2. The best health service	General physician	9 (2.3)	0.8–3.7
	Pediatrician	14 (3.5)	1.7–5.3
	Hospital	97 (24.2)	20.1–28.5
	Dental School	105 (26.3)	21.9–30.6
	General dentist	52 (13)	9.7–16.3
	Pediatric dentist	168 (42)	37.2–46.8
	Endodontist	7 (1.8)	0.5–3
Q3. Tetanus vaccine control	*Yes*	243 (60.8)	56–65.5
	No	157 (39.3)	34.5–44
Q4. Cleaning before replantation of a dirty tooth	*Wash with tap water*	152 (38)	33.2–42.8
	Rub with soap	113 (28.3)	23.8–32.7
	Replant without any procedure	26 (6.6)	4.1–8.9
	Discard the tooth	121 (30.3)	25.7–34.7
Q5. Transportation vehicle	Ice	35 (8.8)	6–11.5
	A liquid	140 (35)	30.3–39.7
	Child's mouth	64 (16)	12.4–19.6
	Child's hand	13 (3.3)	1.5–5
	Paper tissue	168 (42)	37.2–6.8
Q6. Strong media	Tap water	84 (21)	17–25
	Milk	52 (13)	9.7–16.3
	Saliva	78 (19.5)	15.6–23.4
	Alcohol	54 (13.5)	10.2–16.8
	Saline solution	95 (23.8)	19.6–27.9
	Disinfecting solution	94 (23.5)	19.3–27.7
	Chicken egg white	2 (0.5)	0.2–1.2
Q7. Time to replant avulsed tooth	*Immediately*	154 (38.5)	33.7–43.3
	Within 30 min after bleeding control	36 (9)	6.2–11.8
	Within the same day	29 (7.3)	4.7–9.8
	Not important	27 (6.8)	4.3–9.2
	Don't know	154 (38.5)	33.7–43.3

and correct intervention. More than 80% of the participants suggested that management of traumatized teeth to be a priority for their educational programs. Overall, the results showed that participants had a positive attitude toward managing traumatic dental injuries.

In case I, a rather disturbing finding in our study was the fact that 61% did not know the fractured tooth would be permanent in a 9-year-old student. Knowledge in this area is grossly lacking and may lead to neglect in timely and proper management of a permanent tooth that affects long-term prognosis. This finding is in contrast to Hong Kong study where more than 70% of the respondents were knowledgeable in this field (11). It is important to inform the public that a fractured fragment of tooth can be re-attached (10). Unfortunately, in our study, only 34.1% responded they would search for pieces of the fractured tooth, a similar finding to Jordan study (8). Similarly, in the Vergotine (17) study, a low number of teachers knew that a dentist could re-attach a tooth fragment.

Extra-oral time and storage media are two of the most important factors preserving the periodontal ligament (PDL) cells and improving the prognosis for an avulsed tooth (2, 3). In case II, only 13% of our respondents asserted they would immediately replant an avulsed tooth. The majority were concerned with stopping the bleeding, maybe because most people think that bleeding is a very life-threatening factor. Similar results were observed in the studies by Chan and Mohandas (11, 15), whereas in a study conducted in Iran, one in five was acquainted with appropriate time limits for replantation (14). Wasting time on controlling the bleeding in this scenario will lead to delay in replantation and would jeopardize the prognosis.

The clinical management of dental trauma can be complex and involves the use of numerous diagnostic aids and treatment modalities. Correct intervention can play an important role to improve the prognosis of a traumatized tooth. Studies have shown that treatment of dental trauma is often not well managed by dentists (18–21). On the other hand, Hu (21) reported that endodontists had a significant higher mean knowledge score on dental injury scenarios than general dentists. Unluckily, only 1.8% declared that they would consult an endodontist, who may be a worthy consultant.

Despite the widespread efforts to decline the incidence of tetanus, it still remains a major public health problem in developing countries (22). It has been recommended that if the avulsed tooth has contacted soil, and if tetanus coverage is uncertain, refer the patient to a physician to see whether there is a need for a tetanus booster (23). In the present study, about 40% of the teachers said that they would ask whether the child has received tetanus

vaccine and shots. This response is similar to 30% obtained in a study by Caglar (10).

Approximately one-third of the participants said that they could not make any effort to replant or preserve a tooth when it had fallen out on the ground and was covered in dirt. Data are consistent with the study carried out by Caglar (10), but the figure was much higher when compared with that obtained in the Al-Asfour (7) survey with a questionnaire using open questions.This indicates inadequate knowledge and the need for continuous dental emergency training of school teachers.

When it is not possible to replant a tooth immediately, it must be maintained in a proper storage medium. Milk, physiologic saline, tissue culture media, and saliva are suitable to permit periodontal healing. Some of them are not available at the site of accident. Milk has an osmolality within physiologic limits. This improves the vitality of PDL cells during the extra-alveolar period. So milk is superior to saliva as a storage medium (24). Only 13% of our participants chose milk as a proper storage medium, similar to findings of 15% in Singapore (16), 10% in Iran (14), and 9% in Hong Kong (11). This response is lower than the responses obtained in the studies by Blakytny, McIntyre, and Vergotie (9, 13, 17). It indicates that our participants are less knowledgeable regarding correct transport and storage media. 19.5% chose saliva as an appropriate medium. It may be due to the fact that saliva is always easily available at the site of injury. On the other hand, teeth are in a direct contact with saliva in the mouth. A lower awareness was reported in the study by Mesgarzadeh (14) who has reported only 6.2% of the participants said that they would tell the child to carry the tooth in his mouth.

It has been studied that dry preserving of an avulsed tooth for more than 20–30 min would lead to the loss of normal physiologic metabolism and morphology of PDL cells (2, 3). We were surprised to find that only 38.5% of participants reported the immediate treatment. In addition, 9% chose 30 min as the maximum limit of dry time. Chan (11) found, in contrast, that over 60% knew the appropriate time for emergency treatment of an avulsed tooth. However, the study by Al-Asfour (7) bears a significant lack of knowledge in this regard. The data show that it is essential for additional education in this area.

Over 94% of the study population was not satisfied with their knowledge and was keen to receive more information on dental injuries. This overwhelming interest among participants has also been shown in other international studies (13, 16).

Some potential limitations of our study should be mentioned. The first concerns the use of closed-ended questions, which do not allow the researchers to find out all the possible responses. One more imitation could be that as our study used a Likert-type attitude scale respondents may avoid selecting extreme response categories (central tendency bias). Furthermore, because of the cross-sectional design of the study, the participants are unlikely representative of their groups as they were recruited from only a few schools of a city.

Based upon the findings presented in this study, we are developing a combined intervention strategy to promote the knowledge level of teachers regarding dental trauma. The program will provide participants with proper reaction options in different traumatic scenarios, and knowledge level will be assessed for the long term.

Conclusions

Although it was a cross-sectional study and consisted of some limited schools in a city, the data show that the level of lay knowledge on immediate management of traumatized teeth is inadequate in a selection of teachers in Iran and educational campaigns are necessary to improve the prognosis of school children who have the highest risk of adverse dental trauma.

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Appendix 1

Part I: Personal professional information

Gender
- Male
- Female

Age
- ≤35
- 36–45
- >45

Education
- High school diploma
- Associate degree
- Bachelor
- Masters

Position held
- Educational
- Health teacher
- Physical education teacher
- Administrative

First-aid training in general
- Yes
- No

Training for dental emergencies
- Yes
- No

What are the other sources of your knowledge?
.....

Witnessing a traumatic dental injury
- Yes, about how many times?.....
- No

Part II: Attitudes

Please indicate your level of agreement with each of the following statements.

1.	A teacher isn't responsible post traumatic dental injuries.				
	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
2.	Time consciousness for emergency management of dental trauma can play a vital role in improving tooth prognosis.				
	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
3.	A tooth after avulsion will be lost definitely, so there is no need for any treatment.				
	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
4.	Dental trauma emergency management must become one of the educational priorities for teachers.				
	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
5.	Dental trauma management is not an emergency situation.				
	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
6.	Teacher intervention in school dental injuries may play a key role in traumatized tooth survival.				
	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
7.	Emergency management of dental trauma is thoroughly professional and requires special education and training; therefore, there is no need for teacher intervention.				
	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
8.	Wearing of a mouth guard should be compulsory in all contact sport.				
	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
9.	Due to some legal considerations it's advisable that a teacher refrain from intervening such scenarios.				
	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
10.	Having some short pertinent educational experiences, educators can provide better assistance in traumatic dental scenarios.				
	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree

Part III: Knowledge

Please choose the correct answer(s) for each of the questions. You can have more than one answer.

Case I: During school hours, a 9-year-old child is hit in the face with a softball. Her upper front tooth is broken. Otherwise, she is healthy, unhurt and conscious.

Q1. The broken tooth is likely to be:

(a) Temporary tooth

(*b*) *Permanent tooth*

(c) Do not know

Q2. Your immediate emergency management of the case is:

(a) Calm down the child and send her back to the class.

(*b*) *Contact parents and advise them to send child to the dentist immediately*.

(*c*) *Look for the broken tooth piece and send the child to the dentist with it*.

(d) Don't know what to do.

Case II: A 12-year-old boy is hit in the face and his upper front tooth is missing and there is blood in his mouth. Otherwise, he is unhurt, healthy and he didn't lose consciousness.

Q1. The immediate emergency action you would take is:

(a) Stop the bleeding by compressing a cloth over the injury.

(*b*) *Look for the tooth, wash it and put it back in its place*.

(*c*) *Save the tooth in child's mouth and look for professional help*.

(d) Place the tooth in a paper and send the child to dentist after the school time.

(e) Don't know what to do.

Q2. What type of health service would you seek first?

(a) General physician

(b) Pediatric physician

(c) Hospital

(*d*) *Dental School University*

(*e*) *General dentist*

(*f*) *Pediatric dentist*

(*g*) *Endodontist*

Q3. Would you investigate if the child had a tetanus vaccine?

(*a*) *Yes*

(b) No

Q4. If the tooth has fallen on the dirty ground what would you do?

(*a*) *Rinse the tooth under tap water and put it back into its socket*.

(b) Rub away the dirt by a sponge and soap and put it back in its place.

(c) Put it back into the socket immediately without cleaning.

(d) Discard the tooth.

(e) Don't know what to do.

Q5. How would you transport the tooth on the way to the dentist if you cannot put the tooth back into its socket?

(a) Put the tooth in ice

(*b*) *Put the tooth in liquid*

(*c*) *Place the tooth in the child's mouth*

(d) Place the tooth in the child's hand

(e) Wrap the tooth in a handkerchief or paper tissue

Q6. Mark desirable liquids for storing a tooth that has been knocked out while you are on your way to the dentist.

(a) Tap water

(*b*) *Fresh milk*

(*c*) *Child's saliva*

(d) Alcohol

(*e*) *Saline solution*

(f) Disinfecting solution

(*g*) *Chicken egg white*

Q7. Which is the best time for putting back a tooth in if it is knocked out of the mouth?

(*a*) *Immediately after the accident*

(b) Within 30 min after the bleeding has stopped

(c) Within the same day

(d) This is not a crucial factor

(e) Don't know what to do

Part IV: Self-assessment

Q1. Is your knowledge on dental emergency management enough?

(a) Yes

(b) No

Q2. Do you need future education in this regard?

(a) Yes

(b) No

Q3. Are you able to provide proper action when needed?

(a) Yes

(b) No

The correct answers are printed in *italic*.