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Traumatic dental injuries – knowledge and awareness among present and prospective teachers in selected urban and rural areas of Norway

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Abstract – *Aim*: to evaluate the knowledge and awareness of traumatic dental injuries (TDI) in children and adolescents among present and prospective teachers in selected parts of Norway. *Material and methods*: This was a descriptive cross-sectional study among present and prospective teachers. It was based on a questionnaire about TDI in children and adolescents (7–15 years of age). The participants originated from two areas, one rural and one urban. The teacher trainee students were from classes focusing on sport and physical education. Chi-square tests were used for comparisons of groups of responders and relevant variables. *Results*: A total of 143 individuals responded to the questionnaire (response rate 73.7%). Few respondents were aware of the existence of information about managing TDI at their respective schools. Only one responder (rural area) had had any education about TDI, although more than one-third of all the teachers had encountered TDI in school settings. Knowledge related to handling avulsed teeth was lower compared with handling crown fractures. Generally, the teachers had a higher level of knowledge related to the correct handling of TDI compared with the student group and they were also more confident in their respective decisions than the younger group. *Conclusions*: The findings revealed poor knowledge and awareness of TDI among present and prospective teachers in selected parts of Norway.

While the prevalence and severity of dental caries among schoolchildren have declined during recent years (1, 2), a similar reduction in traumatic dental injuries (TDI) has not been registered. On the contrary, it is expected that TDI will increase in the future as, for different reasons, more individuals will be at risk (3). As a consequence, TDI represents a serious dental public health challenge (4). Approximately one-third of all preschool children have experienced TDI in the primary dentition, and one-quarter of all schoolchildren have suffered some sort of injury to the permanent dentition. Data about the prevalence of TDI are believed to be underestimated (5). However, data from epidemiologic studies on the prevalence and incidence of TDI reveal considerable variation, both between (5) and within countries (6). Such variations may reflect differences in environmental, socio-economic, behavioural and cultural backgrounds; methodological factors and different classification systems may also play a role (5). Activities and the environment have been suggested to be more important determinants than gender and age (3). Although the oral region comprises only 1% of the total body area, a study performed in a Swedish county found that TDI make up 5% of all injuries in people up to 30 years old and 17% of all bodily injuries in preschool children (7).

As children living in the industrialized part of the world become more institutionalized (8), more of their time is spent in schools and day-care institutions. Thus, it is not surprising that half of the dental injuries registered in a Norwegian study among 7- to 18-year-olds during a 1-year period, took place during school hours (9). Another study from Sweden focusing on almost the same age group (7–15 years of age), concluded that a predominance of TDI occurred at school (7). Adults near the scene are usually school personnel (10) and teachers specializing in physical education are particularly likely to experience cases of TDI.

Diagnostic and clinical skills, including correct emergency treatment, are crucial for the prognosis of a damaged tooth. Prompt and appropriate onsite emergency management is especially important in cases of avulsion (11). It has been estimated that one-third of teeth experiencing TDI get permanent sequelae (12). Pulp necrosis, root resorption and interruption of tooth development in the case of immature teeth are examples of possible complications, which may entail life-long

multidisciplinary dental treatment (3). Beyond discomfort for the patient, treatment of the complications may be time-consuming for the child and the parent, with loss of school time and transport costs (13).

During recent years, TDI first aid in schools has received increasing attention. School staff knowledge, management practises and experience of TDI have recently been evaluated in several studies (10, 14, 15). A common finding is that, knowledge about emergency treatment among school personnel is poor, despite the fact that during school hours, children are in their supervision. In Norway, no study of this aspect of TDI has been undertaken. The purpose of this study was to evaluate knowledge and awareness of TDI in children and adolescents among present and prospective teachers in urban and rural areas of Norway.

Material and methods

A cross-sectional study among present and prospective teachers, based on a questionnaire related to TDI in children and adolescents (7–15 years of age), was undertaken in western Norway. The selection of schools was convenience based. The schools in the rural area had fewer pupils than the city schools, and they included one secondary school. The teacher population was not selected according to any specialization, whereas the participating teacher students were specializing in physical education. Permission to carry out the study was requested and received from the different local school administrations in advance.

The questionnaire – content

All participants were promised anonymity and informed that permission from their school administration had been obtained and that participation was voluntary. The structured self-administered questionnaire consisted of 11 items covering 4 main topics in traumatology. Some items assessed the degree of confidence of the respondents concerning three imaginary cases of TDI, namely avulsion, crown fracture and intrusion. A response construct similar to a 5-point Likert scale (from strongly unsure to strongly sure) provided quantitative values. For analyses, a dichotomized confidence variable was constructed (0: 'quite unsure', 'unsure' and 'neither unsure nor sure', 1: 'sure' and 'quite sure'). One section of the questionnaire dealt with the availability of information about TDI at the schools as well as whether the teachers had had any education relating to TDI during their training. Other aspects sought information about the participants' experience of managing TDI and, more specifically, how they would act when confronted with a crown fracture or an avulsion. In this section of how to manage TDI, intrusion was not included in the repertoire. The responses considered correct handling were grouped as: (i) 'adequate' or (ii) 'less adequate' and 'inadequate'. Concerning tooth fracture, 'adequate' emergency treatment was defined as 'to find the fragment of the crown and bring it along with the child to the dentist', whereas other responses were classified as 'less adequate or inadequate'. For avulsion, 'adequate' treatment was defined as: 'put the tooth promptly back into the socket and send the child immediately to the dentist or use of suitable storage medium during transport' (saliva, milk, saline). All other responses were categorized as 'less adequate or inadequate'.

Items in the questionnaire were closed, except for a final item which allowed the respondent the opportunity to comment.

The questionnaire – administration

In the urban primary schools, all questionnaires were sent in letters with a prepaid reply envelope inside. In the rural area, the chief of education set up the lists of participants (9 out of 13 schools represented) and distributed questionnaires to the schools, whereas the headmaster of each school was in charge of delivering the questionnaires (with prepaid reply envelope). In the schools of education, teachers of the classes involved administered all questionnaires, including their collection and return. The administration of one school made it clear that they would not accept the extra work associated with the study, e.g. receiving reminders for non-respondents. For this reason, no reminder was sent to potential participants. The questionnaires were distributed in October 2006. All data were collected within early December 2006.

Statistical methods

The returned questionnaires were coded and entered on computer, using SPSS, version 14.0 (SPSS Inc., Chicago, IL, USA). The results were presented in frequency distributions. Chi-square tests were used for comparisons of groups of respondents and relevant variables. The level of statistical significance was set at 5%.

Results

Distribution of invited participants and response rates is given in Table 1.

In the two selected urban schools, the mean teacher age was 49 years and the respondents were 80.0% female. For the nine selected rural schools, the mean age of teachers in the different schools was not obtained. A preponderance (77.3%) of the teachers was female. The female proportion among students was 47.4%.

The bachelor students originated from two classes which focussed on sport and physical education at two different institutions. Seventeen of the students (17/58, 29.3%) were in the first year of their education, whereas the remaining student respondents (70.7%) were in the final year of their education.

Table 1. Response rates among the groups of participants

	Invited participants	Response rate (%)
Teachers – urban area	50	35 (70.0)
Teachers – rural area	62	47 (75.8)
Students	82	61 (74.4)
Total	194	143 (73.7)

Only a few respondents knew about the existence of information regarding the management of TDI at their schools (Table 2). Most teachers (urban: 68.6% and rural: 57.4%) were unsure about the existence of such material, as were almost all students. Only one teacher (rural area) claimed to have had any lecture on the subject (Table 3). None of the students affirmed that they had had any lectures about handling TDI as part of their training or that the subject was scheduled for future lessons (Table 3).

More that one-third of the teachers had been involved in managing TDI in school settings (37.0% from the rural and 35.3% from the urban area). However, only three students (4.9%) had experience of TDI in a school setting (Table 4).

In response to questions about handling crown fractures or avulsions in a school setting, 74.3% and 34.3%, respectively, indicated the most adequate treatments (Tables 5 and 6).

The responses to the questions related to managing crown fractures were neither influenced by being urban or rural teachers, nor by being teachers or teacher students. Generally, the teachers had more correct answers related to the handling of avulsions than the student group (urban teachers, $P = 0.045$, rural teachers, $P < 0.001$). A higher proportion of teachers from the rural area indicated 'adequate' treatment compared with urban teachers. No significant difference was found between the two groups.

Table 2. Responses to the question: 'Is there any information material at your school on managing traumatic dental injuries?'

	Teachers – urban area (%)	Teachers – rural area (%)	Students (%)	Total (%)
Yes	1 (2.9)	6 (12.8)	1 (1.6)	8 (5.6)
Not sure	24 (68.6)	27 (57.4)	57 (93.4)	108 (75.5)
No	10 (28.6)	14 (29.8)	3 (4.9)	27 (18.9)
Total	35	47	61	143

Table 3. Responses to the item 'During your training to become a teacher, did you have any (or, for the students, is there scheduled) lectures about how to manage a TDI situation?'

	Teachers – urban area (%)	Teachers – rural area (%)	Students (%)	Total (%)
Yes	0 (0.0)	1 (2.1)	0 (0.0)	1 (0.7)
Not sure	0 (0.0)	2 (4.3)	24 (39.3)	26 (18.2)
No	35 (100.0)	44 (93.6)	37 (60.7)	116 (81.1)
Total	35	47	61	143

Table 4. Responses to the item 'have you as a teacher or as a student had to manage a TDI situation?'

	Teachers – urban area (%)	Teachers – rural area (%)	Students (%)	Total (%)
Yes	12 (35.3)	17 (37.0)	3 (4.9)	32 (22.7)
Not sure	0 (0.0)	2 (4.3)	0 (0.0)	2 (1.4)
No	22 (64.7)	27 (58.7)	58 (95.1)	107 (75.9)
Total	34	46	61	141

Table 5. Responses (%) to the item 'how would you manage a situation in which a child suffered a crown fracture of an incisor (part of crown broke off). The pupil does not complain about pain'

Response	Teachers – urban area (%)	Teachers – rural area (%)	Students (%)	Total (%)
Adequate	26 (74.3)	40 (85.1)	48 (78.7)	114 (79.7)
Less adequate or inadequate	9 (25.7)	7 (14.9)	13 (21.3)	29 (20.3)
Total	35	47	61	143

Table 6. Responses to the item 'how would you manage a situation in which a child knocks out a permanent incisor?'

Response	Teachers – urban area (%)	Teachers – rural area (%)	Students (%)	Total (%)
Adequate	13 (34.3)	25 (53.2)	11 (16.4)	49 (34.3)
Less adequate or inadequate	22 (65.7)	22 (46.8)	50 (82.0)	94 (65.7)
Total	35	47	61	143

Respondents' confidence concerning management of different TDI cases is given in Table 7. When the confidence variable was dichotomized, teachers from the rural area were more confident about their decisions compared with the teacher students in questions related to crown fracture ($P = 0.045$), avulsion ($P = 0.012$) and intrusion ($P < 0.001$) (Table 7).

There was no significant association between respondents' confidence with respect to adequate handling of the three trauma situations described. However, a weak association existed suggesting that confident respondents selected more often the correct handling of avulsion ($P = 0.062$, NS). When comparing experience of TDI in school settings and confidence, confident responders regarding intrusion had significantly higher experience with TDI ($P = 0.042$).

Discussion

Cautions should be exercised in generalizing the findings of the study to the whole teacher population of Norway. Nevertheless, some background information indicates that the responding groups were reasonably typical. A good response rate for this type of survey was achieved (73.7%) (16), the sample covered geographical variations and it represented different sizes of schools. Some information about reasons for drop-out was also available. For example, in the student group, the lecture when the questionnaires were delivered was not obligatory and thus not all students attended. The age and sex of the present group of teachers were found to correspond with national data. According to Statistics Norway 2003, the

Table 7. Responses to the different questions about the confidence respondents felt in their answers. Confident participants are marked +, and non-confident -

	Teachers – urban area (%)		Teachers – rural area (%)		Students (%)		Total (%)	
Item	+	−	+	−	+	−	+	−
Crown fracture	55.9	44.1	74.5	25.5	55.7	44.3	62.0	38.0
Intrusion	44.1	55.9	63.8*	36.2	29.5	70.5	44.4	55.6
Avulsion	55.9	44.1	74.5*	25.5	50.8	49.2	59.9	40.1

*Teachers from rural area were significantly more confident compared with students, $P < 0.05$.

mean age of teachers working in elementary school education in Norway was 44.8 years (17) and the proportion of women was 70%. Recorded data for teacher students in 2007 showed an excess of female students, three times greater than the proportion of male students (18). The sex difference found in the present student sample was modest, which most probably is associated with a higher proportion of males choosing physical education.

This is the first study in Norway that seeks to acquire baseline information about knowledge and awareness of TDI among present and prospective teachers. It clearly reveals that available information on managing TDI in schools and educational institutions is scarce, at some schools non-existent. It was found that only one respondent was aware of the presence of such information. Another interesting result was that students neither had had any teaching about TDI, nor was such teaching scheduled in the curriculum. Out of the whole sample (teachers and students), there was only one teacher from the rural area who previously had attended a lecture on emergency handling of TDI.

The general conclusion of many international studies dealing with this topic is that school staff have little knowledge related to handling of TDI (10, 19, 20). However, a growing focus worldwide on TDI first aid has emerged, and in some institutions there is now an educational programme. More than one-third of the teachers have received advice regarding TDI, based on studies carried in US (10) and in England and Wales (14). According to a Jordanian study, dental emergency training has also been included as part of teachers' school health education program in that country (15).

More than one-third of the teachers in the present study confirmed that they had encountered cases of TDI, a number comparable with that reported by McIntyre et al. (10). Similar proportions of urban and rural teachers had encountered cases, confirming that many teachers are likely to be required to manage cases of TDI. Unsurprisingly, few students had experienced cases of TDI, consistent with their junior status.

Knowledge of the correct action to take in cases of avulsion was insufficient. Just one-third suggested the optimal management, to replant the tooth and then refer the child to professional dental care. This proportion was nevertheless higher than that reported in a recent US study (10) and a Jordanian study from 2005 (15), and was much higher than presented in a Hong Kong study conducted among physical education teachers (21). The extent to which the responses of the present participants were adequate varied significantly. More than half of the teachers in the rural area responded in accordance with guidelines for proper handling of avulsion while only 16% of the students did so. The proportion of teachers with adequate answers (approximately one-third) in the urban areas was lower, but not significantly, compared with rural teachers. One might speculate about the reasons why teachers in the rural area to a higher extent were more willing to replant avulsed teeth. One explanation might be that in urban areas, where the dental expertise is located nearby, teachers find it more convenient to send the child to the dental clinic without any interventions by themselves. In rural areas, often with no close dental clinic, teachers have to manage such situations. For them, choosing the right option leads unquestionably to a favourable outcome, as otherwise time elapse with extra-alveolar dry storage of the tooth would negatively influence its prognosis (22). However, the long-term prognosis for an avulsed tooth which is not immediately replanted, is enhanced by given a proper medium for storage before reaching the dentist (22). Saliva and milk have found to be the most practical options, but only three respondents suggested those alternatives.

Lack of knowledge may be one reason for not promptly replanting an avulsed tooth, but it is also reported that teachers may be worried about how to stop the bleeding (15) and may fear the legal consequences of incorrect management (23). Naturally, they choose to send the child immediately to professional care where and when this is possible.

It is reasonable to assume that teachers who are certain about how to manage a TDI will act with more confidence. In responses about avulsion, confident responders were more likely than uncertain responders to give the appropriate response.

TDI entails dental problems such as pain, distress and psychological problems for the affected individual (24), and may influence on their quality of life (25, 26). A supporting and caring emergency management at the site of an accident by personnel aware of also the psychological factors connected to TDI, is important to avoid psychological sequelae such as the initiation and development of dental fear.

Conclusion

The findings reveal that the knowledge and awareness related to TDI among present and prospective teachers in selected parts of Norway are low. Knowledge related to the management of avulsed teeth was low compared

with the management of crown fractures. Correct emergency treatment of avulsed teeth is crucial for their long-term prognosis. As care providers, teachers – especially those engaged in sports activities and physical education – constitute an important group for training in TDI emergency management.

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References

1. Hugoson A, Koch G, Gothberg C, Helkimo AN, Lundin SA, Norderyd O et al. Oral health of individuals aged 3–80 years in Jönkoping, Sweden during 30 years (1973–2003). II. Review of clinical and radiographic findings. Swed Dent J 2005;29:139–55.
2. Marthaler TM. Changes in dental caries 1953–2003. Caries Res 2004;38:173–81.
3. Glendor U. Epidemiology of traumatic dental injuries – a 12 year review of the literature. Dent Traumatol 2008;24:603–11.
4. Marcenes W, al Beiruti N, Tayfour D, Issa S. Epidemiology of traumatic injuries to the permanent incisors of 9–12-year-old schoolchildren in Damascus, Syria. Endod Dent Traumatol 1999;15:117–23.
5. Glendor U, Marcenes W, Andreasen JO. Classification, epidemiology and etiology. In: Andreasen J, Andreasen F, Andersson L, editors. Textbook and color atlas of traumatic injuries to the teeth. Copenhagen: Blackwell Munksgaard; 2007. p. 217–54.
6. Skaare AB, Jacobsen I. Dental injuries in Norwegians aged 7–18 years. Dent Traumatol 2003;19:67–71.
7. Eilert-Petersson E, Andersson L, Sörensen S. Traumatic oral vs non-oral injuries. Swed Dent J 1997;21:55–68.
8. Frönes I. The transformation of childhood: children and families in postwar Norway. Acta Sociol 1997;40:17–30.
9. Skaare AB, Jacobsen I. Etiological factors related to dental injuries in Norwegians aged 7–18 years. Dent Traumatol 2003;19:304–8.
10. McIntyre JD, Lee JY, Trope M, Vann WF Jr. Elementary school staff knowledge about dental injuries. Dent Traumatol 2008;24:289–98.
11. Andreasen J, Andreasen F. Avulsions. In: Andreasen J, Andreasen F, Andersson L, editors. Textbook and color atlas of traumatic injuries to the teeth. Copenhagen: Blackwell Munksgaard; 2007. p. 444–88.
12. Sane J, Ylipaavalniemi P, Turtola L, Niemi T, Laaka V. Traumatic injuries among university students in Finland. J Am Coll Health 1997;46:21–4.
13. Glendor U, Halling A, Bodin L, Andersson L, Nygren A, Karlsson G et al. Direct and indirect time spent on care of dental trauma: a 2-year prospective study of children and adolescents. Endod Dent Traumatol 2000;16:16–23.
14. Blakytny C, Surbuts C, Thomas A, Hunter ML. Avulsed permanent incisors: knowledge and attitudes of primary school teachers with regard to emergency management. Int J Paediatr Dent 2001;11:327–32.
15. Al-Jundi SH, Al-Waeili H, Khairalah K. Knowledge and attitude of Jordanian school health teachers with regards to emergency management of dental trauma. Dent Traumatol 2005;21:183–7.
16. Salant P, Dillman D. How to conduct your own survey. New York: John Wiley and Sons; 1994. 22 pp.
17. Statistics Norway (2003). Teachers' statistics. http://www.ssb.no/utlaerer/main.html [accessed on September, 2009].
18. Statistics Norway (2007). Teachers' statistics. http://www.ssb.no/statistikkbanken/selectvarval/saveselections.asp [accessed on September 2009].
19. Al-Asfour A, Andersson L, Al-Jame Q. School teachers' knowledge of tooth avulsion and dental first aid before and after receiving information about avulsed teeth and replantation. Dent Traumatol 2008;24:43–9.
20. Andersson L, Al-Asfour A, Al-Jame Q. Knowledge of first-aid measures of avulsion and replantation of teeth: an interview of 221 Kuwaiti schoolchildren. Dent Traumatol 2006;22:57–65.
21. Chan AW, Wong TK, Cheung GS. Lay knowledge of physical education teachers about the emergency management of dental trauma in Hong Kong. Dent Traumatol 2001;17:77–85.
22. Kenny DJ, Barrett EJ, Casas MJ. Avulsions and intrusions: the controversial displacement injuries. J Can Dent Assoc 2003;69:308–13.
23. Hamilton FA, Hill FJ, Mackie IC. Investigation of lay knowledge of the management of avulsed permanent incisors. Endod Dent Traumatol 1997;13:19–23.
24. Rothman DL. Pediatric orofacial injuries. J Calif Dent Assoc 1996;24:37–42.
25. Cortes MI, Marcenes W, Sheiham A. Impact of traumatic injuries to the permanent teeth on the oral health-related quality of life in 12–14-year-old children. Community Dent Oral Epidemiol 2002;30:193–8.
26. Fakhruddin KS, Lawrence HP, Kenny DJ, Locker D. Impact of treated and untreated dental injuries on the quality of life of Ontario school children. Dent Traumatol 2008;24:309–13.