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**EDITOR:  
B. O. OSOTIMEHIN**

**ASSISTANT EDITOR:  
A. O. UWAIFO**

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records were analyzed for age, gender, cause, location, seasonal distribution and types of injuries. All children 0-15 years who presented to the emergency room or clinic with orofacial injuries were included in the study. Data were entered in the computer and analyzed using EPI INFO version 6.0[17]. It was exported to Systat program for multiple regression analysis [18]. Permission to carry out the study was obtained from the Chief of Surgery, King Fahd Hospital, Al Baha.

### Results

Four hundred and seventy-three children were seen and treated for orofacial injuries in the emergency room and oral surgery clinic over a 5-year period. Only one hundred and thirty (27.5 percent) had injuries which necessitated admission. Admission days ranged from 1-33 days with a mean of 5.6 days. Injuries, which were due to road traffic accidents, had the longest mean admission days (7.5 days).

#### Age distribution

Mean age for all children was  $6.2 \pm 3.7$  years (range from 1 month to 15 years) Table 1.

**Table 1:** Age distribution of children

Age (Years)	No	(%) Total
Under 1 year	8	(1.7%)
1-5	233	(49.3%)
6-15	232	(49.0%)
Total	473	(100%)

#### Sex distribution

There were significantly more males ( $n = 332$ ) than females ( $n = 141$ ) ( $X^2 = 77.1$ ,  $P < 0.01$ ). Male: female ratio was 2.4: 1. Mean age of all males was  $6.7 \pm 3.7$  years while that for the females was  $5.2 \pm 3.5$  years. The males were significantly older than the females ( $P < 0.0001$ ).

#### Etiology of injury

Over 60 percent of all injuries were due to falls and significantly more pre-school children were involved in a fall when compared with the older children 6 years and above ( $X^2 = 15.11$ ,  $P < 0.001$ ). Falls, motor vehicle accidents followed by direct blunt trauma were responsible for over 97 percent of all orofacial injuries in children. Other causes of injury are shown in Table 2.

**Table 2:** Etiology of injury in children

Cause	No	% Total
Motor vehicle accident	90	(60.5%)
Direct blunt trauma	84	(17.8%)
Gun shot	4	(0.8%)
Burns	4	(0.8%)
Unknown	5	(1.1%)
Total	473	100%

For all motor vehicle injuries, none of the 86 children occupants had seat belts on, while the remainders were knocked down as pedestrians.

#### Site of injury

The commonest site of injury was the forehead region which was followed by the peri-orbital and eye areas and areas around

the mouth. Together they accounted for about two-thirds of all injuries (Table 3).

**Table 3:** Anatomical site of injury

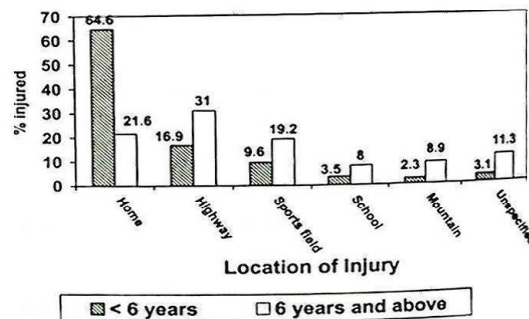
Anatomical site	No	% Total
Forehead	114	(24.1%)
Eyes/Periorbital	110	(23.3%)
Lips/tongues/gums/dento-alveola/palate	105	(22.2%)
Chin and Mandible	41	(8.7%)
Nose	39	(8.2%)
Multiple sites	29	(6.1%)
Cheek	26	(5.5%)
Maxilla	9	(1.9%)
Total	473	100%

#### Seasonality of injuries

Of the 473 cases, 356 (75.3%) took place during the summer months while only 117 (24.7%) occurred during the winter months. The summer months were significantly associated with the occurrence of injuries ( $X^2 = 96.1$ ,  $P < 0.0001$ ).

#### Place of injury

The overwhelming majority of injuries in children under the age of 6 years occurred at Home, while the highway/street was the commonest location for injuries in the older children (6 years and above). Figure 1 show the place of injury according to age of the child.



**Fig. 1:** Location of injury by age

#### Multiple regression analysis

Logistic regression analysis was used to construct a model of variables to predict the occurrence of injury and to eliminate effect of confounders. Age and seasonality were significant determinants of injury in children and together predicted 46.9 percent in the variance due to injury. Significantly more injuries

**Table 4:** Adjusted odds of having an injury

Variable	OR*	(95% Confidence interval)	p-value
<b>AGE</b>			
Under 6 years	2.0	(1.3-3.3)	0.003
6 years and above			
<b>SEASON</b>			
Winter	0.51	(0.30 - 0.87)	0.013
summer	1.0		

\*Quasi - Maximum likelihood adjusted odds ratio

## Factors associated with oro-facial injuries among children in Al-baha, Saudi Arabia

<sup>1</sup>TO Lawoyin, <sup>2</sup>DO Lawoyin, and <sup>3</sup>JO Lawoyin

<sup>1</sup>Department of Community Medicine, <sup>2</sup>Department of Oral Pathology, College of Medicine, University College Hospital, Ibadan, Nigeria. <sup>3</sup>Department of Oral Surgery, King Fahd Hospital at Al-baha, Kingdom of Saudi Arabia

### Summary

This study was prompted by the dearth of injury data among children in Saudi Arabia. Data were collected prospectively on all children 0-15 years who presented to the King Fahad Hospital at Al Baha with oro-facial injuries over a period of five consecutive years. These records were analyzed for age, gender, seasonal distribution, cause, location and types of injuries. The mean age of the injured children was  $6.2 \pm 3.7$  years. Falls, motor vehicle accidents followed by direct blunt trauma were responsible for over 97 percent of all oro-facial injuries in children, and over 60 percent of all injuries were due to falls. The forehead, eye, periorbital areas and the mouth accounted for about two-thirds of all injury sites. Most injuries 356 (75.3%) occurred during the summer months while only 117 (24.7%) occurred during the winter months. The difference was significant ( $P < 0.0001$ ). The large majority of injuries, which occurred in children under the age of 6 years, took place at home, while road traffic accidents were the commonest cause of injury in the older children 6 years and above. Following logistic regression analysis, age (6 years and under) was associated with increased risk of injury while the winter months were associated with a lower risk. In addition, the study found no statistically significant difference in the prevalence by sex. Having a safe home environment, health education programmes directed towards the caretakers of young children and legislation in support of seat belts will go a long way towards reducing injuries among children in this community. A multi-disciplinary clinical management approach is envisaged due to the different injury sites and facilities would need to be equipped to take care of all types of orofacial injuries.

**Keywords:** Oro facial injuries, children, associated factors, Saudi Arabia.

### Résumé

Cette étude a été motivée par le manque de données des blessures parmi les enfants en Arabie Saoudite. Les données ont été collectées prospectivement sur tous les enfants de 0 à 15 ans qui se sont présentés à l'hôpital King Fahad à Al Baha avec des blessures orofaciales sur une période de cinq années consécutives. Ces rapports ont été analysés suivant l'âge, le sexe, la raison de distribution, cause localité et types de blessures. L'âge moyen des enfants blessés était de  $6,2 \pm 3,7$  ans. Les tombées, accidents de voitures suivi par des traumatismes directs et brusques étaient responsables de plus de 97% et plus de 60% des blessures étaient causées par les chutes. Le front, les yeux, les zones péri-orbitales et la bouche concernent près du deux tiers de tous les sites de blessures. La plupart des blessures 356 (75,3%) ont eu lieu en été alors que seulement 117 (24,7%) en hiver. La différence était significative ( $P < 0,0001$ ). La grande majorité des blessures chez les

enfants de moins de 6 ans a eu lieu à la maison, alors les accidents de route étaient la cause commune de blessures chez les enfants de plus de 6 ans. L'analyse de régression multiple, l'âge (moins de 6 ans) était associé à un risque intense de blessure alors que les mois d'hiver étaient associés à un risque peu élevé. En plus, l'étude ne montre aucune différence significative dans la prévalence du sexe. Avec un environnement sans danger les programmes de santé d'éducation tournés vers les gardiens des jeunes enfants et une législation en support des ceintures de sécurité auront une longue portée sur la réduction des blessures d'enfants dans cette communauté. Une gestion clinique multidisciplinaire est envisagée à cause des différents sites de blessures, et le besoin d'équiper (d'améliorer) les facilités pour prendre soins de tous les cas de blessures oro-faciales.

### Introduction

Injuries are the commonest cause of death in young children in the USA and studies have found maxillo-facial injuries to be relatively common in children because of their greater cranial-mass-to-body ratio [1]. Etiologies of such injuries are diverse among which include abuse and neglect, sports, motor vehicle accidents, firearms, attack by animals, burns and interpersonal violence [2-9]. Sex differences have been noted, with some studies describing significantly more injuries in males, while others found no significant sex difference [1,10-13]. Data on trauma to the orofacial region are important because of the untoward sequel and effect on development. Dentofacial injuries, which occur for example, before the primary dentition erupts, can result in damages to the primary and permanent dentition [14]. The effect of orofacial injuries can be quite serious, even life threatening if prompt and adequate care is not received [12,14-16]. Knowledge of the types and pattern of injury and factors associated with these injuries are therefore useful when preparing and implementing preventive strategies. They are also necessary for health care planning purposes at facility level.

Oro facial injuries in children are common in Saudi Arabia but there is virtually no literature on such injuries especially from the Al Baha region. Too few reports are available also on etiology and pattern of orofacial injuries in children from Saudi Arabia. This prompted the study, which looks at etiology and pattern of, as well as some factors associated with orofacial injury among children in Al-Baha region of Saudi Arabia.

### Materials and methods

Al-Baha region is situated in the southwestern part of Saudi Arabia and has a population of about 500,000. The King Fahad Hospital, a 450-bedded hospital receives referrals from seven smaller hospitals as well as from 24 primary health care clinics within its catchment area. The vast majority of orofacial injuries and other accidents are referred to this hospital. The data collected is therefore a fair representation of what occurs at community level. Data were collected prospectively on all children who visited the King Fahad Hospital emergency room and the oral surgery clinic records from April 1990 to March 1995. These

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occurred in the preschool children (under 6 years) and significantly fewer injuries occurred during the winter months. Sex of the child was not significant following logistic regression analysis (Table 4).

#### Discussions

Injury and types among children outside developed countries have not received sufficient attention in literature. This information is needed for health facility planning purposes, to determine treatment plan and for designing appropriate preventive measures to reduce the portion of children involved in such injuries.

From the above data the commonest cause of injury in children was due to a fall. This occurred in nearly two-thirds of the cases and most of the injuries occurred at home. Falls from heights have significant morbidity and mortality risks and most falls have been shown to occur in the home environment. The younger children (under 6 years) in particular were more likely to sustain injuries due to falls, this finding compares favorably with that of several authors [2,17]. Various reports blame unnecessary risks during play and insufficient supervision by adults at home for most injuries which occur at home [2,17,19,20]. That information is essentially lacking in the data presented, however, making the home environment safe and directing health education programmes towards the primary caretakers of young children will go a long way towards preventing injuries especially those due to falls in children. Though the highways and road traffic accidents were responsible for most of the injuries in the older children, use of seat belt was generally absent in this study. Use of seat belts is recommended but not mandatory in this community and previous studies have also shown a very low level of use [7]. Few children were knocked down as pedestrians and efforts should also be made to ensure safe driving along the highway.

Seasonality of injury has been noted by some authors, with most injuries occurring in the summer [17]. From the data presented, the summer months were significantly associated with injuries while the winter months were not. During the summer months, the children are at a greater risk of sustaining injuries for two major reasons, one is that schools are usually out on holidays and secondly, the weather is conducive for outdoor recreational activities and sports. Children are more likely to receive close supervision while at school in this community. These factors, in addition to the restrictive winter weather, could be responsible for the fewer injuries recorded in the winter months. This may offer an explanation as to why fewer injuries occurred among the older children, since it is obligatory in this region for children 6 years and above to be in school.

Several earlier studies reported a preponderance of injuries in males [1,10,11,21,23]. This is in agreement with what was found in this study following bivariate analysis. However following logistic regression analysis, the data did not show any significant sex difference in injuries. The large unadjusted effect of the male gender following bivariate analysis may be due to the large number of males seen in this study as well as in the other studies. Several other studies in agreement with this study show no difference in prevalence between boys and girls [12,13]. Following logistic regression analysis, age was a determining factor in this study, and the younger children (under 6 years) were more likely than the older ones (6 years and above) to be injured. This finding is in contrast to what was found in another longitudinal study carried out in Europe [22]. Having a safe home environment, health education programmes directed towards the caretakers of young children and the legislature in support of seat belts especially for minors will go a long way towards

reducing childhood injuries in this community. A multi-disciplinary clinical management approach is envisaged due to the different sites of injury and facilities would need to be equipped to take care of all types of oro-facial injuries.

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