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Epidemiology of soccer-related head injury in children 5–14 years in Victoria, Australia

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ABSTRACT (150 words)

Aim

Our aim was to use epidemiological data to determine the incidence of soccer-related head injuries in children aged 5-14 years who presented at emergency departments (EDs) or were admitted in hospitals in Victoria, Australia.

Methods

ED presentation and hospital admission de-identified aggregate data were from the Victorian Injury Surveillance Unit. Soccer participation data were compared with the soccer-related head injury data to determine the incidence of this injury among these children.

Results

The incidence of ED presentations was 0.17% of children participating in soccer during the study period (financial years 2011-2012 to 2015-2016). The 10-14-years age group presented with more head injuries than the 5-9-years age group. For the admissions data, soccer had a significantly lower (*P*=0.0379) incidence of head injury when compared with ‘’sport as a whole’.

Conclusions

The low incidence of soccer-related head injuries presenting to an ED or admission to hospital is consistent with international findings.

KEYWORDS

Head injury, soccer, children, emergency department (ED), admission, football, Victorian Injury Surveillance Unit (VISU)

Brief Points

"What is already known on this topic?"

- There is international research in soccer-related head injury in the 5-14 years age group

- The only Australian-based research on soccer-related head injury in children is from admissions data in New South Wales hospitals.

"What this paper adds"

- In children aged 5-14 years, the incidence of soccer-related head injuries presenting to an ED in hospitals in Victoria, Australia is approximately 1 in 500 soccer participants.

INTRODUCTION

In Australia, soccer has the second highest sports participation rate for children aged 5-14 years[1]. Soccer has a unique sport-specific skill called “heading” that places participants at additional risk of head injury not only by head-to-ball contact and player collision, but also through the potential of head-to-head contact when competing to “head” the ball[2]. In two European studies involving children and youth playing soccer aged under 10 to under 16, there were on average 9 to 35 headers per match, and the incidence of head injury was 0.2-0.7 per 1000 match play hours[3,4].

In New South Wales, Australia, a study on sports-related hospitalisations in children aged 5-15-years for the period 2005-2013 found that 9.2% of soccer-related injuries were to the head[5]. The only other Australian-based research on soccer-related head injury is in individuals aged 15 years and over[6].In the younger demographic, soccer participation rates are 50% higher in Australia[1] and limited evidence suggests that the risk of sport-related head injury in children of this age group is also potentially higher. Australian-specific recommendations on head injury management in the under 14 age group is lacking[5]. Hence, the aim of this study was to add evidence on the incidence of soccer-specific head injury in children aged 14 years and under in Victoria, Australia.

METHODS

A retrospective analysis of de-identified aggregate data obtained from the Victorian Injury Surveillance Unit (VISU) which is situated within the Monash University Accident and Research Centre in Melbourne, Australia, was undertaken. VISU has ethics clearance from the Monash University Human Research Ethics Committee to disseminate these data (Project ID: 21427 - Victorian Injury Surveillance Unit: Custody, use and dissemination of Victorian hospital admissions and Emergency Department data). The head injury aggregated tabular data used in this study was obtained by direct application to VISU. As it is publicly available aggregate data, use of this data is exempt from ethical review.

Data collection

De-identified aggregate data were from two different data sets: the Victorian Emergency Minimum Dataset (VEMD) and the Victorian Admitted Episode Dataset (VAED) and these data are incorporated in the analysis Excel spreadsheet provided in the Supplementary information. Data collection spanned the financial years, 2011-2012 to 2015-2016 for ED presentation at Victorian public and private hospitals, and 2012-2013 to 2015-2016 for hospital admissions. When comparing data between the two data sets, the time interval 2012-2013 to 2015-2016 was used.

The VEMD and VAED data are based on Australian financial years (Jul 1 to Jun 30), and thus for a winter sport like soccer, the data for the second half of one season is combined with that for the first half of the following season. However, the available Australian sport participation and census data are based on calendar years. To resolve this, the participation and population data were adjusted from a calendar year to a financial year basis, to align with the VEMD and VAED data sets. This was done by calculating the average of the two calendar years involved.

The VEMD data are ED presentations for treatment of injuries arising from unintentional soccer-related injury to the head in children. The VEMD collects data from all Victorian hospitals with 24-hour EDs. Selection criteria to extract the data specific to this study were as follows: (1) ED presentations inclusive of the financial years 2011-2012 to 2015-2016 (2) children aged 5-14 years, (3) the VISU field code of "description of event" contained the term "soccer" and its variations such as football [these cases were manually checked for relevance] (4) the body region was coded 'head, excludes face', (5) field code "human intent" was coded to "non-intentional harm", (6) cases were limited to incidence; excludes (1) return visits and (2) pre-arranged admissions.

VAED data relate to unintentional head injury in children that required hospitalisation from all Victorian public and private hospitals. It includes data for all sports, and all admissions, including soccer. Data were extracted using the International Statistical Classification of Disease and Related Health Problems, Tenth Revision, Australian Modifications (ICD-10-AM)[7]. The selection criteria for the dataset were as follows: (1) the financial year of admission was inclusive of 2012-13 to 2015-16, (2) children aged 5-14 years, (3) principal diagnosis was a community injury using ICD-10-AM codes (S00-T75 or T79), (4) a head injury (S06.00-S06.03 ICD-10-AM codes) was indicated in any one of the 40 diagnosis codes, (5) occurring coded as "during sport and exercise", (6) first occurring activity code in sport and exercises category was soccer (U50.04 ICD-10-AM code). Exclusion criteria: (1) admissions as a result of transfer from another hospital or statistical separation within the same hospital. As the VAED data set contained data for 'all sports', this was used to assess the incidence of head injury requiring hospitalisation between soccer and 'sport as a whole', for children aged 5 to 14 years in Victoria, Australia. The football data comprised sub-categories of 'Australian rules football', 'soccer', 'rugby', 'football unspecified' and 'rugby unspecified'. The number of head injuries identified as 'football, unspecified' is of a similar magnitude to that identified as soccer-related (74 *c.f.* 72 respectively). To address this, the number of 'football unspecified' head injuries that were likely soccer-related was estimated

by assuming that the probability of a football head injury being allocated to 'football, unspecified' rather than to the actual football code, is independent of the football code, the year, or the gender of the child involved. Thus, the share of soccer-related head injures labelled 'football, unspecified' was proportional to the share of head injuries attributed to soccer in relation to all head injuries identified with a specific football code. The number of soccer-related head injuries augmented by soccer's estimated share of 'football, unallocated' head injuries has been used in the analyses herein (see Excel spreadsheet in the Supplementary Information).

Victorian children population

The Victorian population of children by gender was determined by interpolation between the 2006 and 2016 Australian Census data[8,9]. Total population data were obtained by using ABS census data for 2006[8] and 2016[9] to interpolate the estimated populations by age range and gender for the years of interest by assuming that there was a constant exponential growth rate from 2006 to 2016. The interpolated population data was adjusted to ensure that the interpolated data complies with the requirement

$$N_{Children} = N_{Girls} + N_{Boys}$$

not only for a given interpolated year, but also when totalled across years, and when broken down into sex and age ranges.

Soccer and 'All Sports' Participation

Comparative analyses of the head injury data for the VEMD and the VAED data sets required an estimation of participation rates by gender and by total number of children. This information was obtained from the Australian Bureau of Statistics (ABS) soccer participation data[10] and Football Federation of Victoria soccer growth rates[11]. Both data sets were publicly available online. Soccer and all sports participation data were extracted from the ABS Sport Participation Survey 2006-2012[10] which was conducted every three years from 2006 to 2012 and then discontinued. For 2006, 2009 and 2012, the survey reported the number of participants by gender in each sport and the total number of sports participations (participants could select multiple sports which increased the number of participations). For 2012, the ABS data also included the total number of participants in sport. Using this information, the total sports participants for 2006 and 2009 were estimated by assuming the ratio of participants to participations was the same as in 2012. The spreadsheet in the Supplementary Information includes a copy of the ABS sport participation data including ABS comments on the levels of confidence associated with the data points (see red triangles at the upper right corners of the cells).

The Victorian Health Survey 2015[12] provides data on participants in all sports and de-identified participation in individual sports. As the 'all sports' data was consistent with the earlier ABS data, it was included as an 'all sports' data point in the estimation of all sports and soccer participation rates for children aged 5-14 years in Victoria during the study period of financial years 2011-2012 to 2015-2016.

The Excel add-in Solver (in Office 365 Version 1912, Build 12325.20344) was used to estimate the soccer participation numbers for children in Victoria by assuming that the data increased exponentially each year between 2006 and 2016. The parameters of best fit minimised the sum of squares error (SSE) between actual and estimated participation values. These parameters were then used to estimate participation rates for the years of interest in a manner similar to that described by Graham[13]. In formulating the model for the known data, all data points were treated as being of equal importance. Additionally, the equations used preserved the relationship between boys, girls, and children participation values as expressed by the known data points. Consequently, the model was defined by the following three equations, where N represents the number of participants:

$$N_{Children} = N_{Girls} + N_{Boys}$$

$$N_{Boys} = Ae^{a(Year-2006)}$$

$$N_{Children} = Be^{b(Year-2006)}$$

The convergence criterion for Solver to determine the best values for A, a, B and b was set to minimise the total sum of squares error (SSE_{Total}) for all the data points (made up of 9 for the soccer data, and 12 for the all sports data). That is:

$$SSE_{Total} = SSE_{Children} + SSE_{Boys} + SSE_{Girls}$$

To assess the quality of the estimated lines of best fit, the confidence intervals were calculated for each known and estimated data point. As the curves of best fit are close to linear, the standard linear method for calculating confidence intervals[14] was applied using Excel functions (see the Excel spreadsheet in the Supplementary Information).

Data analysis

To compare the incidence of head injury between soccer and 'sport as a whole' in the VAED data set, the Mann Whitney U test was applied to the head injury admissions data using GraphPad™ Prism (v6.0). The statistical significance criterion was $P \leq 0.05$.

RESULTS

Over the 5-year period for the VEMD data set, there were 454 soccer-related head injuries where children aged 5 to 14 years presented to EDs in Victorian hospitals. Of these, 379 were in males and 75 were in females (83.5% and 16.5% respectively) (Table 1). Soccer-related head injuries were most prevalent in the 10-14 years age group, where there were 336 (74%) compared with 118 (26%) in the 5-9 years age group (Table 1). The proportion presenting with soccer-related head injuries increased over the study period from 0.1 to 0.24% of soccer participants (Table 2).

The mean (± 95% confidence intervals) number of children aged 5-14 years in Victoria participating in soccer and 'all sports' for the period 2006-2016, estimated from the ABS and Victorian Health Survey data, are shown in Figure S1a-c and in Figure S2a-c and in the Excel spreadsheet in the Supplementary Information.

From the VAED data for the financial years 2012-2013 to 2015-2016, there were 1893 children aged 5-14 years admitted to Victorian hospitals with a head injury (Table 3). These admissions increased each year in the categories, all-head injuries, sport-related head injury and soccer-related head injuries. Of the 1893 admissions, 915 were for sport-related head injuries and 86 were for soccer-related head injuries (Table 3). This means that 4.5% of all admissions for head injury were soccer-related (5.4% for boys and 2.2% for girls).

For the admissions data (Table 4), soccer had a significantly lower (P=0.0379) incidence of head injury leading to hospitalisation when compared with all sports. This finding assumes that the average time exposed to risk of injury per year per participation is the same for soccer and for all sports. Importantly, this result remained unchanged whether the estimated number of soccer-related head injuries that had been assigned as 'football, unspecified' was included, or not.

Overall, males and the 10-14-years age group had the highest rates of soccer-related head injury in this study encompassing both ED presentation and hospital admission.

DISCUSSION

Our findings show that for children aged 5-14 years in Victoria, the incidence of soccer-related head injury presentations at hospital EDs was 0.17% (1 in 500 children) for the period 2011-2012 to 2015-2016 (Table 2). Children aged 10-14 years had approximately three times the number of ED presentations for soccer-related head injuries compared with children aged 5-9 years (Table 1). Our findings are consistent with work by others

internationally who found that children aged 10-14 years had the highest rate of soccer-related head injuries[15-21]. On the other hand, the VEMD data set did not specifically distinguish between the male and female head injury-events in this age bracket. Taken together, it is possible that female soccer players have higher rates of head injury, but these did not require hospital evaluation and so were not picked up by our study in children presenting to hospital EDs in Victoria. In a large study in 144,604 children who presented with soccer-related injuries to EDs in the USA in 2000, the incidence of soccer-related injuries to the head (excluding face) of children aged 5-14 years was low at 0.1 to 0.2 per 1000 children[18]. In a further six international studies[15-19,21] encompassing this age group, the incidence of soccer-related head injury was also low in a manner similar to that of 2 per 1000 (4 per 1,000 boys, 2 per 1,000 girls) for Victorian children presenting to EDs.

For children aged 5-14 years admitted to hospital with a sports-related injury in Victoria, 9.4% had a soccer-related head injury (Table 3), in agreement with sports-related hospital admissions data for 2005-2013 in children aged 5-15 years in New South Wales (Australia), where 9.1% were admitted with a soccer-related head injury[5]. The proportion of soccer participants aged 5-14 years admitted to a Victorian hospital with a soccer-related head injury was low at 0.039% (Table 4). The proportion of all head injury admissions of Victorian children aged 5-14 years admitted to hospital with soccer-related head injuries was 4.5% (Table 3). This is aligned with the 3.5% of Canadian children aged 5-19 years, who presented to ED's with a sports-related injury requiring hospital admission with the leading causes being minor head injuries (26.8%) and concussion (36.6%)[17].

Regarding limitations, the proportion of soccer-related head injuries presenting to an ED in Victorian hospitals in the present work may be an underestimate of the true burden of injury in children aged 5-14 years. Contributing factors include self-assessment by the care giver as to whether a child's head injury requires medical attention and prior presentation to the family doctor for an assessment as to whether attendance at the hospital ED was warranted. Although the soccer participation rates were extrapolated from ABS data for the years beyond 2012, the narrow 95% confidence intervals (Figure S1a-c) for these data give confidence in the estimated values. Additionally, the 2015 data point for 'all sports' participation was in good agreement with the extrapolated ABS 'All Sports' data (Figure S2a-c). Herein, the number of soccer-related head injuries included an estimate of those mis-assigned as 'football-unspecified'. Importantly, the Mann Whitney U test (based on ranking) showed that the result was unchanged whether or not this estimate was included in the total.

As the present data are from one state of Australia only, our findings may not be generalizable to all other States of Australia or nationally. Nevertheless, there are several key recommendations for future research. Firstly, comparison of soccer-related and sports-related head injury data Australia-wide is required to gain a greater understanding of the incidence of soccer-related head injury rates in children. Improvements can be made in the recording of soccer participation numbers in each state of Australia as well as nation-wide. A more comprehensive analysis that compares head injury rates for children aged 5-14-years for all prominent football codes in Australia would be invaluable.

CONCLUSIONS

In children aged 5-14 years, the incidence of soccer-related head injuries presenting to an ED in hospitals in Victoria, Australia was approximately 1 in 500 participants and the admissions rate was low at 0.039% of soccer participants. Our data suggest that fewer head injuries occur in children playing soccer compared with ‘sport as a whole’.

REFERENCES

1. Roy Morgan. 2014. The Top 20 sports played by Aussies young and old(er). Available at: http://www.roymorgan.com/findings/6123-australian-sports-participation-rates-among-children-and-adults-december-2014-201503182151. Accessed 03/03/2018.
2. USA Soccer, Implementation Guidelines for U.S. Soccer's Players Safety Campaign: Concussion Initiatives & Heading for Youth Players. Available at: http://usclubsoccer.org/2016/03/14/implementation-guidelines-for-u-s-soccers-player-safety-campaign-concussion-initiatives-heading-for-youth-players/. Accessed 01/03/2018.
3. Beaudouin F, Gioftsidou A, Larsen MN *et al.* The UEFA study: Heading incidence in children's and youth' football (soccer) in eight European countries. Scand. J. Med. Sci. Sports 2020; Apr 26. doi: 10.1111/sms.13694. [Epub ahead of print].
4. Sandmo SB, Andersen TE, Koerte IK, Bahr R. Head impact exposure in youth football – Are current interventions hitting the target? *Scand. J. Med. Sci. Sports* 2019; **30**: 193-98.
5. Schneuer FJ, Bell JC, Adams SE *et al.* The burden of hospitalized sports-related injuries in children: an Australian population-based study, 2005-2013. *Inj. Epidemiol.* 2018; **5**: 1-10.
6. Cassel E, Clapperton AJ, Kerr K. Adult sports injury hospitalisations in 16 sports: the football codes, other team ball sports, team bat and stick sports and racquet sports. 2012. Available at: https://www.monash.edu/__data/assets/pdf_file/0009/218475/haz74.pdf. Accessed 02/04/2017.
7. National Centre for Classification in Health Australia. Fundamentals of morbidity coding using ICD-10-AM, ACHI and ACS 2016. Available at: https://www.accd.net.au/Icd10.aspx. Accessed 03/03/2018.
8. Australian Bureau of Statistics, Population by Age and Sex, Australia, 2006. Available at: https://www.abs.gov.au/AUSSTATS/abs@.nsf/allprimarymainfeatures/2F33D3E91BA0F08FCA2574A900130EE7?opendocument. Accessed 08/03/2018.
9. Australian Bureau of Statistics, Population by Age and Sex, Australia. 2016. Available at: https://www.abs.gov.au/AUSSTATS/abs@.nsf/allprimarymainfeatures/2F33D3E91BA0F08FCA2574A900130EE7?opendocument. Accessed 03/03/2018.
10. Australian Government. Children's Participation in Cultural and Leisure Activities. 2012. Available at:

http://www.abs.gov.au/AUSSTATS/abs@.nsf/Lookup/4901.0Explanatory%20Notes1Apr%202012?OpenDocument. Accessed 08/03/2018.

11. Football Federation of Victoria. Football Player Numbers Rise 20% In Two Years. 2016. Available at: http://www.footballfedvic.com.au/football-player-numbers-rise-20-in-two-years/. Accessed 03/03/2017.
12. Department of Health and Human Services. Victorian Population Health Survey 2015: Selected survey findings. 2017. Available at: https://www2.health.vic.gov.au/public-health/population-health-systems/health-status-of-victorians/survey-data-and-reports/victorian-population-health-survey/victorian-population-health-survey-2015. Accessed 03/03/2018.
13. Graham K. Regression using Excel's Solver. Electronic proceedings of the thirteenth annual international conference on technology in collegiate mathematics. Atlanta, Georgia. Paper 2000, paper C013. http://archives.math.utk.edu/ICTCM/i/13/C013.html#abs. Accessed 08/03/2018.
14. Zaiontz C. Real statistics using Excel. Confidence intervals and prediction intervals using Excel. 2013. http://www.real-statistics.com/regression/confidence-and-prediction-intervals/. Accessed 08/03/2018.
15. Brito J, Malina RM, Seabra A *et al*. Injuries in Portuguese youth soccer players during training and match play. *J. Athl. Train.* 2012; **47**: 191-97.
16. Fridman L, Fraser-Thomas JL, McFaull SR, Macpherson AK. Epidemiology of sports-related injuries in children and youth presenting to Canadian emergency departments from 2007-2010. *BMC Sports Sci. Med. Rehabil*. 2013; **23**: 5:30.
17. Giannotti M, Al-Sahab B, McFaull S, Tamim H. Epidemiology of acute head injuries in Canadian children and youth soccer players. *Injury* 2010; **41**: 907-912.
18. McFaull S, Subaskaran J, Branchard B, Thompson W. Emergency department surveillance of injuries and head injuries associated with baseball, football, soccer and ice hockey, children and youth, ages 5 to 18 years, 2004 to 2014. *Health Promot. Chronic Dis. Prev. Can.* 2016; **36**: 13-14.
19. Kirkwood G, Hughes TC, Pollock AM. Results on sports-related injuries in children from NHS emergency care dataset Oxfordshire pilot: an ecological study. *J. R. Soc. Med*. 2019; **112**: 109-18.
20. Adams AL, Schiff MA. Childhood Soccer Injuries Treated in U.S. Emergency Departments. *Acad. Emerg. Med*. 2006; **13**: 571-574.
21. Faude O, Rossler R, Junge A *et al*. Head injuries in children's football- results from two prospective cohort studies in four European countries. *Scand. J. Med. Sci. Sports* 2017; **27**: 1986-92.

Table 1 Number and percentage of soccer-related head injuries in children aged 5-14 years that presented to an ED of hospitals in Victoria by gender and age bracket, between financial years 2011-2012 to 2015-2016.

Sex	**Presentations Number and (%) of Total**	**Children Age (yrs)**	**Presentations Number and (%) of Total**
Male	379 (83.5)	5-9	118 (26.0)
Female	75 (16.5)	10-14	336 (74.0)
Total	454 (100.0)	5-14	454 (100.0)

+ Soccer-related head injury rates were calculated by dividing the number of head injuries per financial year by the number of soccer participants in the same financial year. In Australia, a financial year is Jul 1 to Jun 30.

Table 2 Number and proportion of soccer-related head injuries in children aged 5-14 years that presented to EDs of hospitals in Victoria between financial years 2011-2012 and 2015-2016.

Financial Year (Jul 1-Jun 30)	Number of head injuries and (%) of Total	Soccer participants (M + F) (n)	Proportion of head injuries in soccer participants (%)
2011	55 (12.1)	49,500	0.11
2012	50 (11.0)	50,179	0.10
2013	96 (21.1)	52,974	0.18
2014	132 (29.1)	55,925	0.24
2015	121 (26.7)	59,039	0.20
Total	454 (100.0)	267,617	0.17

Table 3 Number and proportion of soccer-related and 'all sports'-related head injuries requiring admission to hospital in children aged 5-14 years in Victoria, Australia.

Financial Year (Jul 1 – Jun 30)	Head Injury Admissions			
	Number of All Admissions	Number and Proportion (%) of All Admissions due to All Sport	Number and Proportion (%) of All Admissions due to Soccer	Number and Proportion (%) of All Sports Admissions due to Soccer
2012	312	152 (48.7)	8 (2.6)	8 (5.3)
2013	420	199 (47.4)	19 (4.5)	19 (9.5)
2014	557	266 (47.8)	29 (5.2)	29 (10.9)
2015	604	298 (49.3)	30 (5.0)	30 (10.1)
Age 5-9 Total	633	143 (22.6)	11 (1.7)	11 (7.7)
Age 10-14 Total	1260	772 (61.3)	75 (6.0)	75 (9.7)
Boys Total	1392	733 (52.7)	75 (5.4)	75 (10.2)
Girls Total	501	182 (36.3)	11 (2.2)	11 (6.0)
Grand Total	1893	915 (48.3)	86 (4.5)	86 (9.4)

Aggregated sports head injuries include those from the following sports: Australian Rules football, Football unspecified, Soccer, Basketball, Motorcycling, Horseback riding, Cycling, Skateboarding, Rugby unspecified, Cycling BMX, Scooter riding, Cricket, Mountain bike riding, Netball, Swimming, Ice skating, High Jump, Gymnastics, Tennis. Football unspecified was distributed pro rata to the specific football codes.

Table 4. Number and proportion of soccer-related and 'all sports'-related head injury admissions to Victorian hospitals normalised by participation (Soccer, All Sports) of children aged 5-14 years, for the financial years 2012-2013 to 2015-2016.

Financial Year (Jul 1 – Jun 30)	**Participants**		**Head Injury Admissions**	
	Soccer	**All Sports**	**Number and Proportion (%) for Soccer Participants**	**Number and Proportion (%) for All Sports Participants**
2012	50,179	423,685	8 (0.016)	152 (0.036)
2013	52,974	442,836	19 (0.036)	199 (0.045)
2014	55,924	462,852	29 (0.052)	266 (0.057)
2015	59,039	483,774	30 (0.051)	298 (0.062)
Boys Total	163,657	1,083,905	75 (0.046)	733 (0.068)
Girls Total	54,458	729,242	11 (0.020)	182 (0.025)
Grand Total	218,115	1,813,147	86 (0.039)*	915 (0.050)

**p=0.0379 (Mann-Whitney U-test)*