ORIGINAL ARTICLE

Predictive Accuracy of Paediatric Trauma Score, our experience at Children Hospital, Lahore

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ABSTRACT

Aim: To find predictive accuracy of pediatric trauma score (PTS) in terms of mortality in the Children's hospital and institute of child health Lahore.
Study design: Cross sectional study.
Setting: Paediatric Surgery department, CH & ICH, Lahore.
Duration of study: 1st January 2019 to 30th June 2019.
Methods: All patients presented with trauma, aged 1-15 years were included in study. All patients with major burn, associated cardiac injuries (e.g., stab heart), victims who required monitoring and hospitalization less than 24 hours, and those referred to other hospitals were excluded from the study. Initial assessment of all patients was done and paediatric trauma score was evaluated in the emergency room. Patients were managed and 24 hours follow-up was done to predict the mortality.
Results: From 290 children, 207(71.38%) were males and 83 (28.6%) were females. Mean age of the children was 7.53 years. The most common mode of trauma was Car accident in children 67(23.1%), followed by Auto rickshaw vs. motorcycle n= 50 (17.24%), and auto rickshaw vs. pedestrian 40(13.79%). Mean Hospital Arrival Time in Minutes was 100.31 minutes. Mean paediatric trauma score amongst all children was 7.22. Overall mortality was reported in 27(9.3%) children. PTS < 8 turned out to be statistically significantly related to mortality (P value < 0.001). Patients with diagnostic test characteristics of PTS < 8 to predict mortality were having sensitivity 91.0%, specificity 56.1%, positive predictive value 38.4%, negative predictive value 95.4% and the diagnostic accuracy of 64.1%.
Conclusion: By Paediatric trauma score we can predict about the necessity of critical interventions in patients and also, we can predict percentage of mortality in paediatric trauma patients. However, accuracy of paediatric trauma score seems to be moderate in detecting most severe paediatric trauma cases.
Keywords: PTS, mortality, hospital arrival time, morbidity, major burn predictor.

INTRODUCTION

Trauma is one of the significant causes of child mortality and morbidity in the world. About 830,000 children die every year from unintentional injuries.[1] Although 95% of these injuries occur in developing countries, but they also remain a significant problem in developed countries i.e. 40% of all paediatric mortality[2]. In the UK, trauma is a major cause of child mortality,16% in those aged 1–4 years to 40% in 15–19-year-olds[3]. Although in developed countries mortality rate of injured children has declining trend, but in South East Asian developing countries the decline is very slow and minimal. 25% of children had post-traumatic stress disorder after a motor vehicle accident[4].

Although a few reports have been published, literature about this important issue is still lacking. The scoring systems are used to collect scientific data and for comparison between institutions in a time period[5]. Scoring system is good tool in critical care because physicians' analysis is too subjective for quality assessment in big samples[6].

A study published the sensitivity and the specificity of paediatric Trauma score 90.5% and 83.1% respectively in patients with paediatric trauma score <8.[7] Another study reported mean paediatric trauma score in trauma patients was 11.04+/_1.66 but they did not find sensitivity and specificity of PTS[8]. Critics of the PTS says that the additional training of public workers to use this system is unnecessary because existing adult scoring systems are good enough to be used in the pediatric population[9].

The rationale of my study is to validate paediatric trauma scoring system in paediatric population as no local study is available. Due to considerable and high rate of accidents and deaths due to trauma in children hospital, we need accuracy of paediatric trauma score so that we can use it in future to predict hospital morality.

MATERIAL AND METHODS

This cross sectional study was conducted in Paeds Surgery Department of children Hospital and University of Child Health Lahore for a period of 6 months. A total of 290 cases, presented with trauma, aged 1-15 years with either gender, were considered for this study. All patients with major burn, concomitant cardiac injuries (e.g., stab heart), victims who required monitoring and hospitalization less than 24 hours, and those referred to other hospitals were excluded from the study. Initial assessment of all patients was done and paediatric trauma score was evaluated in the emergency room. Patients were managed and 24 hours follow up was done to note the in-hospital mortality.

Data collection: Cases which fulfil the selection criteria was entered in my study from emergency departments of CH & ICH. Informed consent was obtained from every patient. Demographic information like age, gender, contact number and address was obtained. Initial assessment of patient done and paediatric trauma score was evaluated by practitioners in the emergency room. Paediatric trauma score parameters are listed in following table.

PTS	+2	+1	-1
Weight	>20kg	10-20kg	<10kg
Airway	Patent	Maintainable	Unmaintainable
Systolic B/P	>90mmHg	50-90mmHg	<50mmHg
CNS	Awake	Unconscious	Unresponsive
Fractures	None	Closed	Multiple
Wounds	None	Minor	Major, penetrating

Interpretation
A. Score Range: +12 to -6
B. Trauma score <= 8 shows significant mortality risk
After calculating paediatric trauma score patient was managed and 24 hours follow up was done to note the in hospital mortality. All data was entered on a Performa.

Data analysis procedure: The data was entered and analysed through SPSS version 21. Quantitative variables were calculated by mean. Qualitative variables were calculated by frequency and percentage. Effect modifier like age and sex were controlled through post stratification. Sensitivity, specificity, positive predictive value and negative predictive value tests were used to predict accuracy for in hospital mortality.

RESULTS

Out of a total of 290 children, 207(71.38%) were males and 83(28.6%) females. Mean age of the children was 7.53 years. Majority of the children 141(48.62%) were of 6 to 12 years of age, while 115 (39.66%) of less than 6 years and 34(11.72%) with more than 12 years of age.

Automobile accident was the commonest mode of trauma amongst children with 67(23.1%), followed by Auto rickshaw vs. while riding on a motorcycle. 50(17.24%), auto vs. pedestrian 40(13.79%), falling down from height 31(10.69%), bicycle crash 29(10%), auto rickshaw vs. bicycle 24(8.28), motorcycle crash 19(6.55%), head struck by high impact stuff 12(4.14%) and by other modes 18(6.21%). Mean hospital arrival time in minutes was 100.31 minutes. Most of the children, 230(79.31%) reached emergency department within 120 minutes while 60(20.69%) patients reach in more than 120 minutes. Mean paediatric trauma score amongst all children was 7.22. Most of the children, 159(54.8%) reported with paediatric trauma score< 8 while 131(45.17%) with paediatric trauma score> 8. Overall mortality was reported in 27(9.3%) children within 24 hours of their stay in hospital. When mortality was compared in terms of different studied variables, PTS < 8 turned out to be statistically significantly related to mortality (P value < 0.001) while all other study variables were insignificant (P value > 0.05).Diagnostic test characteristics of PTS <8 to predict mortality were as follows: sensitivity 91.0%, specificity 56.1%, PPV 38.4%, NPV 95.4% and diagnostic accuracy 64.1%.
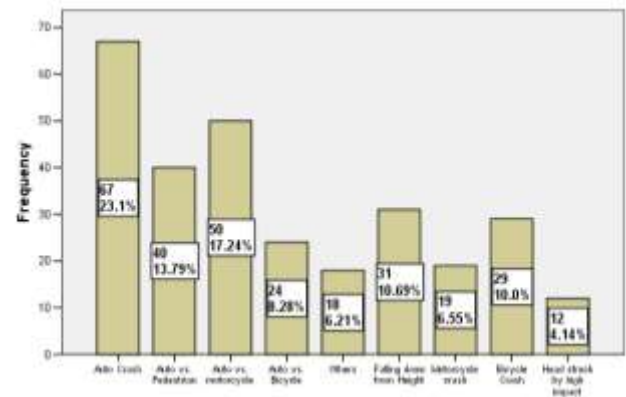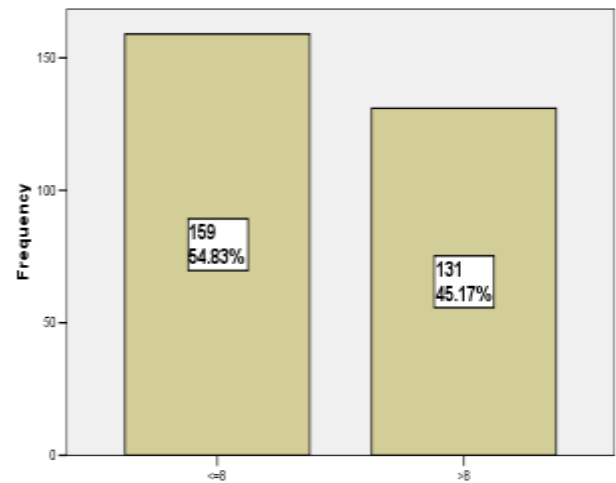
Graph 1:Distribution of gender amongst all children
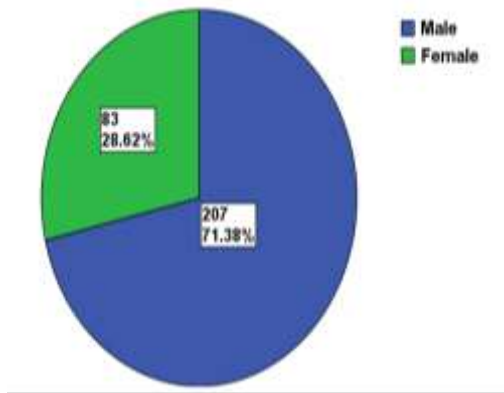
Graph 2:Distribution of Age (years) Groups amongst all children
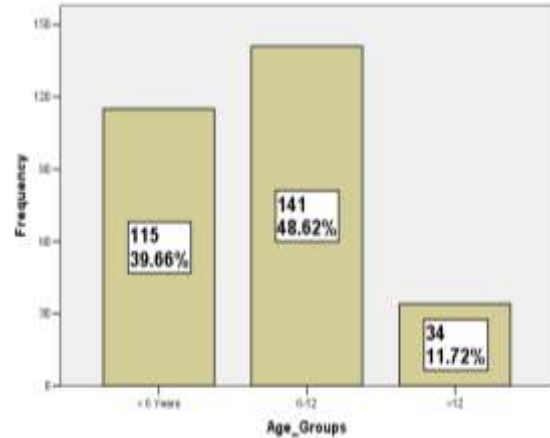
Graph 3: Mode of Trauma amongst all children

Graph 4:Distribution of PTS scores amongst all children

Graph 5:Overall Outcome amongst all children
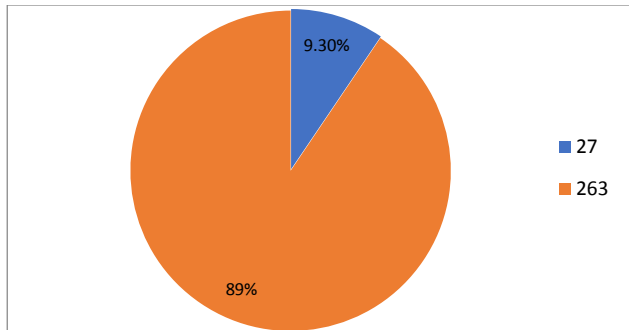
Table 1: Outcome of children and PTS

PTS_Cate	Outcome		Total
	Dead	Alive	
<=8/count	61(91%)	98(43.9%)	159(54.8%)
>8 %within outcome	9(9%)	125(56.1%)	131(45.1%)
Total			
Count	67	223	290
%within outocome	100%	100%	100%

Table 2: Diagnostic test characteristic for PTS to predict mortality

Characteristics	PTS < 8
Sensitivity	91.0
Specificity	56.1%
Positive Predictive Value	38.4%
Negative predictive Value	95.4%
Diagnostic Accuracy	64.1%

DISCUSSION

Accuracy of paediatric trauma score to predict mortality is still debated. The paediatric trauma score was initially developed to check children's vulnerability to traumatic injury. My study is based on dissertation approved for FCPS part 2. In our study we encountered 290 cases of paediatric trauma patients in duration of 6 months, 141 patients (48.62%) were from 6 to 12 years of age while 115 patients (39.66%) were less than 6 years and 34 patients (11.72%) were more than 12 years of age (Fig. 2). While in a study done by Derakshanfar H et al, mean age was 8.62 years. Mean hospital arrival time was 100.31 minutes while in another study was 134 minutes[10]. The sensitivity of paediatric trauma score <8 for predicting major trauma is 61.5% and the specificity is 77.3% respectively. While sensitivity and specificity turned out to be 91% and 56.1% respectively in our study (Table 2). In our view paediatric trauma score <8 was more common in critical patients so we used to cut off value of paediatric trauma score of 8 similar to another study performed by Tepas et al. in our study mortality was noted in 23.1% of children. Out of which 61 patients (91%) has paediatric trauma score <8.

CONCLUSION

We conclude that by paediatric trauma score we can predict about the necessity of critical interventions in a better way and also we can predict percentage of mortality in trauma patients. However, its accuracy seems moderate. pediatric trauma score appears to be effective in detecting the critical patients due to most severe pediatric trauma.

Strength of study: Firstly**,** Paediatric trauma is very important issue in our hospitals so with the help of paediatric trauma score we can assess and manage critical patients early. Our results are highlighting moderate accuracy for predicting critical patients. Secondly, we have large sample size to assess paediatric trauma score.

Limitations In our study we did not compare the paediatric trauma score to other paediatric trauma scoring systems. Moreover, we analysed only total score of PTS rather than deeper analysis. The comparison between the PTS on admission at the paediatric emergency and the Glasgow Outcome Scale score at discharge was not done.

Conflict of interest: Authors have no conflict of interest.

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