

Pattern Of Trauma In Central India: An Epidemiological Study With Special Reference To Mode Of Injury

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Citation

M Swarnkar, P Singh, S Dwivedi. *Pattern Of Trauma In Central India: An Epidemiological Study With Special Reference To Mode Of Injury*. The Internet Journal of Epidemiology. 2009 Volume 9 Number 1.

Abstract

Research question: What are the various epidemiological factors related to trauma cases? Objectives: 1. To assess the prevalence of trauma coming to hospital 2. To know the various epidemiological factors related to trauma cases 3. To know cause and mode of injury Study design: Descriptive study. Setting: Study was performed in department of surgery Shyam Shah Medical College & Hospital, Rewa. Madhya Pradesh, India Participants: 350 trauma victims reported in one year period. Study variables: Demographic characteristics of the victims, time, day and month of injury. Type of trauma, cause and mode etc. Statistical analysis: Proportions. Results: Out of total 3625 admissions, annual incidence of trauma was 22.78%. RTA was the commonest cause of injury (46.85%). Most common age group affected was 11-40 year age group (64.06%), with predominance of Male (79.4%) and rural population (72%). The commonest victims of trauma were Labourer (37.66%). Maximum cases of trauma occurred during summer (58.9%). Jeep was the most common vehicle involved (33.53%). In road traffic injury cases, frontal impact was the commonest mode (51.47%) most cases were unintentional injury (68%) and Alcohol intoxication was present in 11.07% of cases.

INTRODUCTION

Trauma represents a major epidemic of non-communicable disease in present century. They are no longer considered accidental but are part of the price we pay for the technological progress. Trauma has its own natural history and follow the same epidemic pattern as any other disease that is agent, the host and the environment interacting together to produce injury or damage. They occur more frequently in certain age group, at certain times of day and the week and at certain localities. Injuries caused 9% of the total deaths. Among the total disability-adjusted life-years (DALYs), 13% were due to injuries. The WHO-World Bank Report, which reviewed the disease transformation scenarios, indicates that RTIs will be the third leading cause of mortality by 2020, moving up from their present ninth position. Similarly, suicide and violence will move from the twelfth and sixteenth to tenth and fourteenth positions by 2020[1]. Among both children aged 5-14 years, and young people aged 15-29 years, road traffic injuries are the second-leading cause of death worldwide[2] The mortality and economic losses imposed by morbidity resulting from injuries are largely preventable. However, the development of effective injury prevention efforts depends on reliable and detailed information on the incidence and pattern of injury.

In developed countries, such data are available from vital statistics registers and health care records. However, such records are of limited value in developing countries. Many ill or injured persons in these countries never receive medical care from orthodox health facilities, and many deaths are not reported; making health records an incomplete source of data. Injury as a research problem has also been largely ignored in developing countries [3-5]. An examination of 'years of potential life lost' indicates that injuries are the second most common cause of death after 5 years of age in India [6]. Injury is thus a long-overlooked health problem that deserves study. This study was conducted to understand and describe the incidence and pattern, cause and mode of injuries.

MATERIALS AND METHODS

The present study was conducted in Department of Surgery, Shyam Shah Medical College and Associated Hospital Rewa during the period of June 2004 to July 2005. The study group-consisted of first 350 Trauma victims out of total 826 trauma patients admitted in surgery ward of one year period. Inclusion criteria were injured patients of any age presenting to the casualty department. A pretested trauma registry form was completed for all trauma patients with informed consent. However, if the patient was brought unconscious or

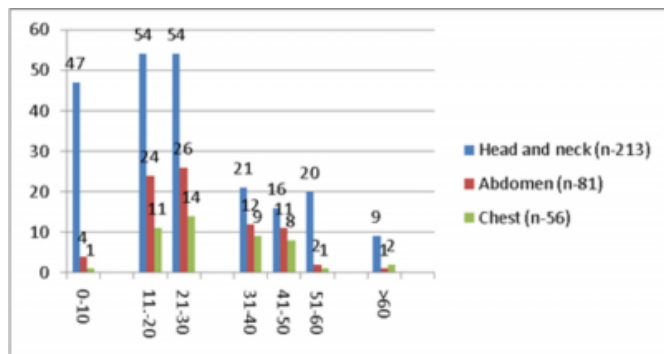
disoriented, an attempt was made to collect the information from the patient's attendant. If there was no attendant or if consent was not given, the victim was excluded from the study. Basic demographic characteristics, time and date, nature and cause of injury, vital signs and outcome data were recorded. In case of road traffic injury Type of vehicle and Mode of collision was recorded; thorough clinical examination and necessary investigations were done. The collected data was entered in Microsoft Excel and analyzed. The ethical committee of Shyam Shah Medical College had approved the study protocol.

RESULTS

Out of total 3625 admissions in a year in surgical ward, annual incidence of trauma was 22.78% (826 cases).

Figure 1

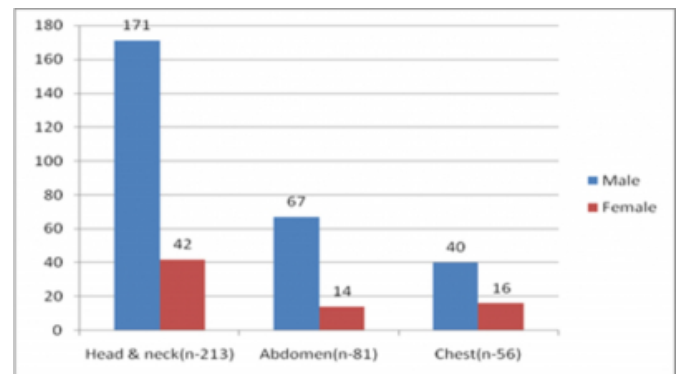
Figure1: Age wise distribution



Most of the injuries were seen in 11-40 year age group (64.06%) of which 21-30year age group suffered the maximum injuries (26.53%), cases >50yrs contributed only 10.05% of total admission(Fig.1).Head injury (60%) constituted the commonest form of injury mostly affecting 11-30 years of age group (49.99%); predominantly male sex (48.24%) followed by abdominal (23.14) and chest injuries (16%)(Fig.1&2).

Figure 2

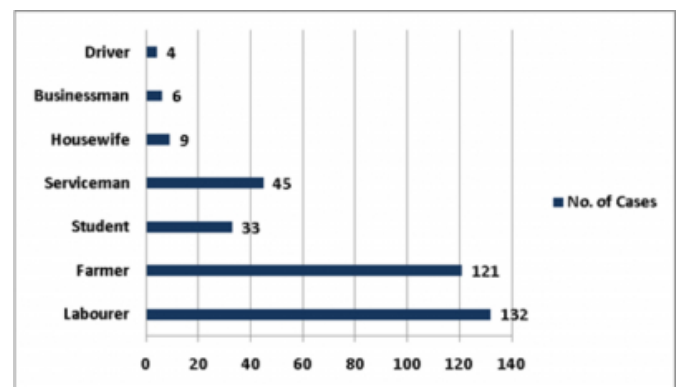
Figure2: Sex wise distribution



Male (79.4%) far outnumbered female (20.6%), the male to female ratio being 3.9:1(Fig.2). Victims from rural population were affected more than the urban population (72% Vs 28%).

Figure 3

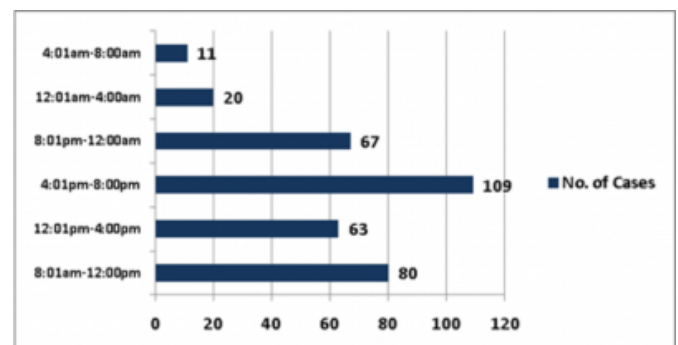
Figure3: Distribution According to Occupation



Laborers (37.66%) were the commonest victim of trauma followed by farmers (31.8%) (Fig.3).

Figure 4

Figure4: Diurnal variation of trauma cases



Majority of cases were admitted during 4.00 p.m. to midnight (50.28%)

Figure 5

Table1: Distribution according to seasonal variation

Season	Month	cases	Percentage	
Sumer (n-206)	March	34	9.8	58.9
	April	57	16.2	
	May	65	18.7	
	June	50	14.2	
Rainy (n-83)	July	20	5.6	23.57
	August	34	9.8	
	September	15	4.2	
	October	14	3.97	
Winter (n-61)	November	26	7.42	17.41
	December	14	4	
	January	10	2.85	
	February	11	3.14	

Maximum cases of trauma occurred during summer (58.9%) followed by rainy and winter season (23.57% and 14.74% respectively) (Table-1). Maximum number of injuries occurred on road (62.10%) followed by working places (25%)

Figure 6

Table2-Distribution according to cause of injury (n-350)

S.	Cause		No.	Percentage
1	RTA	Motor Vehicle	136	38.85
		Pedestrian	28	8
2	Fall		74	21.14
3	Assault		96	27.42
4	Miscellaneous		10	2.85
5	Unknown		6	1.71
	Total		350	100

Among the various injuries RTA was the commonest cause of injury (46.85%) followed by assault (27.42%) and fall injuries (21.14%) (table2).

Figure 7

Table3-distribution according to mode of injury

Mode of injury			No.	percentage
A. Motor vehicle injury (n-136)	RTA	Frontal impact with up and over motion	58	42.65
		Frontal impact with down and under motion	12	8.82
	Roll over	30	22.06	
	Lateral impact	26	19.12	
	Side swipe or rotational impact	7	5.14	
	Ejection	Partial	2	1.47
		Complete	1	0.73
	B. Pedestrian (n-28)	Bumper impact	28	100
	Fall(n-74)	Fall from Tree	25	33.78
		Fall from Stairs	9	12.16
Fall from Roof		12	16.21	
Fall from Motor Vehicle		4	5.4	
Fall into Well		12	16.21	
Fall from bed		7	9.45	
Fall on Ground		5	6.75	
assault(n-96)	Blunt	58	60.41	
	Sharp object	28	29.16	
	Gunshot	6	6.25	
	Miscellaneous	4	4.16	
Miscellaneous (n-10)	Bull Horn	6	60	
	Thresher Machine	1	10	
	Dog Bite	1	10	
	Cracker explosion	1	10	
	Bear Bite	1	10	
unknown		6	1.17	

Frontal impact was the commonest mode (51.47%) followed by roll over (22.05%), lateral impact (19.11%) and rear impact (17.64%) respectively. Ejection constituted least common mode (2.2%) and all the patients sustained multiple injuries. In RTA involving pedestrian, vehicle bumper impact was the only mode of injury (100%) (Table3). In case of frontal impact front to rear was commonest pattern of collision (58.69%) .In cases of fall injuries fall from tree was the commonest mode (33.78%) followed by fall from roof and fall into well (16.21% each) and in assault cases blunt object constitute commonest mode of injury (60.41%) followed by sharp object (29.16%). In miscellaneous injury bull horn injury was the most common injury (Table-3). Most of injuries in study group were unintentional (68%). In our study alcohol intoxication was present in 11.07% and majority of them were assault cases (16%) followed by RTA (11.58%). High mortality was seen among 11-30years of age group (56.4%) and male sex (16.2%) belonging to rural population (79%). Complete recovery was seen in 43.4% of cases whereas partial recovery and disability was observed in 24% and 16% respectively. Death occurred in 16.57% of the cases; most of them had severe head injury.

DISCUSSION

Decreasing the burden of injuries is among the main challenges for public health in the next century as injuries are preventable and many effective strategies are available[5]. In present study we found that annual incidence of trauma was 22.78% and there is increase in incidence of trauma in same institute from 8.9% to 22.78% from 1981-2001, supports the WHO prediction that trauma will

rise from 9th leading burden of disease in 1990 to third leading cause in 2020 worldwide[1]. Most of the injuries were seen in 11-40 year age group (64.06%) of which 21-30year age group suffers the maximum injuries (26.53%), cases >50yrs contribute only 10.05% of total admission. Similar findings were observed in other studies [7-12]. Higher incidence of major injuries among children and youth emphasize urgent need of incorporating basic principles of accident prevention in the formal as well as non-formal education of children from the very beginning. It is also clear from above study that involvement of age group 21-30, which is the most productive group of society suggesting huge economic loss to the country. Male far outnumbered female, the male to female ratio being 3.9:1. Male predominance observed also by many authors [7, 9, 12-16] suggest that in our society males being the earning members of family are subjected work related stress and more exposure to outside environment as compared to females who usually remain within house premises most of the time. As it is also evident that head injury (60%) being commonest injury mostly affecting 11-30 years of age group and predominantly male sex similar observation were made in other studies [15-18]. In present series, rural population was significantly affected as compared to urban. Higher magnitude of problem in rural setting is due to ill controlled hostile environment associated with instability of agricultural, employment, low income with deficient educational system provides a milieu that is rendering them more prone to injuries [7, 12-13]. Laborers were the commonest victim of trauma followed by farmers [14, 19-20], the reason being among the 830 lakh engaged in the unorganized sector (82.2%), agriculture is the major activity followed by workers and laborers [7]. Majority of cases were admitted during 4.00 pm to midnight [peak incidence 4-8 pm (31.14%) followed by 8-12 pm (22.5%)] which is also observed in other studies [8, 12, 18-22], twilight condition with increased fatigue and decreased alertness leads to increased trauma and maximum cases of trauma occurred during summer followed by rainy and winter season respectively [14, 21, 23-24]. In rural settings harvesting during summer leads to interpersonal disputes and assault injuries. In rainy season trauma cases are mainly of fall from tree and RTA due to very poor road condition and unsafe driving specially by smaller vehicle. Some studies showed maximum cases during winter followed by summer due to different geographical condition [18]. Maximum number of injuries occurred on road (62.10%) followed by working places (25.98%) [13, 16, 20]. High incidence of trauma on

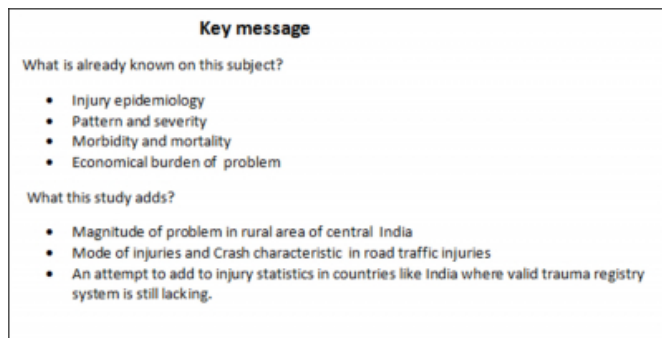
roadside may be attributed to the following reasons: There is almost no segregation of pedestrian from wheeled traffic, widespread disregard of traffic rules and defective layout of cross roads and speed breakers. Among the various injuries RTA was the commonest cause of injury (46.85%) followed by assault and fall injuries. Predominance of RTA as cause of injury shown in other studies followed by fall or assault depending upon socioeconomic condition[9-11, 16, 25]. Type of vehicle involved in accident depends upon main mode of transport in a particular locality [7, 18-19]. In our study jeep was the most common vehicle involved, followed by the trucks. In RTA involving motor vehicle accident, frontal impact was the commonest mode [26-27] and front to rear was commonest collision pattern (58.69%)[28-30]. It has also been observed in other study that being knocked down and falling off vehicles as most common mode of injury which is best explained by the fact that major vehicles involved in the study were two wheelers[19]. In RTA involving pedestrian vehicle bumper impact was the only mode of injury (100%)[2]. Direction of impact has potential use in determining the nature of injury. In cases of fall injuries fall from tree was the commonest mode (33.78%)[31-32], followed by the fall from roof[33] and fall into the well (16.21% each); similar results have also been shown in the other studies as well. In rural setting where people mainly depend on forest for food, fodder and fuel fall from tree constitutes most common mode of injuries. Fall from roof is more common during summer as most of people sleep on roof which often does not have protective boundaries; summer is also season of kite flying causes fall injury in children and adolescents. In assault cases blunt object constitute commonest mode of injury (60.41%)[17, 34-35] followed by sharp object (29.16%) while in few studies sharp object was the commonest mode because of habit of carrying knives in a particular community[36]. Most of injuries in study group were unintentional (68%) [9, 16]. Alcohol intoxication was present in 11.07% cases and majority of them were assault cases (16%) followed by RTA(11.58%)[37]. After sustaining injury, high mortality is seen among 11-30years of age group and male sex belonging to rural population[7]. Complete recovery is seen in 43.4% of cases, partial recovery and disability in 24% and 16% respectively. Death occurred in 16.57%; most of them having sustained severe head injury [16].

CONCLUSION

Trauma in India is a significant social and financial burden which requires prioritized attention. The death rate ought to be reduced with better organized systems of trauma care.

Data from similar study can be used as tool for making policy and planning of trauma program. Trauma System should be to provide universal emergency care with equity of access and considered as basic right. Trauma is bound to consume resources regardless of whether there are systems capable of achieving favorable outcomes. Cost-effectiveness should be the concern while make planning and policies.

Figure 8



References

1. Murray, C.J. and A.D. Lopez, Alternative projections of mortality and disability by cause 1990-2020: Global Burden of Disease Study. *Lancet*, 1997. 349(9064): p. 1498-504.
2. M Peden, L Sminkey. World Health Organization dedicates World Health Day to road safety. *Inj Prev* 2004; 10:67.
3. Tursz, A., Epidemiological studies of accident morbidity in children and young people: problems of methodology. *World Health Stat Q*, 1986. 39(3): p. 257-67.
4. Zwi, A.B., et al., Injuries in developing countries: policy response needed now. *Trans R Soc Trop Med Hyg*, 1996. 90(6): p. 593-5.
5. Krug, E.G., G.K. Sharma, and R. Lozano, The global burden of injuries. *Am J Public Health*, 2000. 90(4): p. 523-6.
6. Mohan D., News from India. *Injury Prevention*, 1999. 5(2): 157-158.
7. G. Gururaj. "Injuries in India: A national perspective" In Background Papers: Burden of Disease. New Delhi: The National Commission on Macroeconomics and Health, Ministry of Health and Family Welfare, 2005:325-47
8. Odero W, Garner P, Zwi A. Road traffic injuries in developing countries: a comprehensive review of epidemiological studies. *Tropical Medicine & International Health*, 1997; 2(5): 445-460
9. Olawale OA, Owoaje ET. Incidence and pattern of injuries among residents of a rural area in South-Western Nigeria: A community-based study. *BMC Public Health* 2007;7:246
10. Ahmet DEMİRCAN, Ayfer KELEŞ, Forensic Emergency Medicine – Six-Year Experience of 13823 Cases in a University Emergency Department. *Turk J Med Sci* 2008. 38(6): 567-575.
11. Singh B., et al., Profile of trauma related mortality at Manipal. *Kathmandu Univ Med J (KUMJ)*. 2008 Jul-Sep;6(23):393-297.
12. Mishra B, Sinha ND, Sukhla SK, Sinha AK. Epidemiological study of road traffic accident cases from Western Nepal. *Indian J Community Med* 2010;35:115-21
13. Ma J, Guo X, Xu A, et al. Epidemiological analysis of injury in Shandong Province, China. *BMC Public. Health* 2008; 8:122.
14. Jha N, Agrawal CS, Epidemiological Study of Road Traffic Accident Cases: A Study from Eastern Nepal. *Regional Health Forum WHO South-East Asia Region*, 2004;8(1): 15-22.
15. Malhotra C, Singh MM, Garg S, Malhotra R, Dhaon BK, Mehra M. Pattern And Severity Of Injuries In Victims Of Road Traffic Crashes Attending A Tertiary Care Hospital Of Delhi. *Anil Aggrawal's Internet Journal of Forensic Medicine and Toxicology*, 2005; Vol. 6, No. 2 (July - December 2005)
16. Karbakhsh M, Zandi NS, Rouzrokh M, Zarei MR, Injury epidemiology in Kermanshah: the National Trauma Project in Islamic Republic of Iran. *Eastern Mediterranean Health Journal*, 01 January 2009, vol. 15/1(57-64), 10203397
17. Brink O, Vesterby A, Jensen Jr. Pattern of injuries due to interpersonal violence. *Injury* 1998; 29(9): 705-9.
18. SK Lahiri, P Mandal, P Mandi, SP Mitra & T Chatterjee. A study on cases contracting road traffic accidents in rural area and attending the tarakeswar rural hospital, west bengal .*Indian journal of preventive & social medicine*, 2005. 36(3&4),94-101
19. Jha Nilambar ; Srinivasa DK ; Roy Gautam ; Jagdish S ; Minocha RK. Epidemiological Study of Road Traffic Accident Cases: A Study from South India. *Indian Journal of Community Medicine* Vol. 29(1). 2004:20-20.
20. Ghimire A, Nagesh S, Jha N, Niraula SR, Devkota S An Epidemiological Study of Injury among Urban Population. *Kathmandu Univ Med J (KUMJ)* 2009 Oct-Dec; 7(28):402-7.
21. Stomp W; Fidler V; ten Duis HJ; Nijsten MW. Relation of the weather and the lunar cycle with the incidence of trauma in the Groningen region over a 36-year period. *J Trauma*, 2009. 67(5): 1103-8.
22. QUAZI Sazzad Hossain, Sajal Kumar ADHIKARY, WAN HASHIM Wan Ibrahim, REZAUR, R.B. road traffic accident situation in khulna city, bangladesh. *Proceedings of the Eastern Asia Society for Transportation Studies*, 2005. 5: 65-74.
23. Bhattacharyya T, Millham FH. Relationship between weather and seasonal factors and trauma admission volume at a level I trauma center. *J. Trauma* 2001; 51: 118-22.
24. Friede KA, Roesler JS, and Azam A et al. Predicting Trauma Admissions: The Effect of Weather, Weekday, and Other Variables. *Minnesota Medicine*. 2009; 92(11): 47-49
25. W Maziak, KD Ward, S Rastam Injuries in Aleppo, Syria; first population-based estimates and characterization of predominant types. *BMC Public Health*. 2006; 6: 63.
26. M Fitzharris, R Dandona, GA Kumar, L Dandona. Crash characteristics and patterns of injury among hospitalized motorised two-wheeled vehicle users in urban India. *BMC Public Health*, 2009. 9(1): 11.
27. A Kual, US Sinha, YK Pathak, Fatal road traffic accidents, study of distribution, nature and type of injury. *Journal of Indian Academy of Forensic Medicine*. 2005; 27(2):71-76
28. J O'Day, LD Filkins, CP Compton, TE Lawson . Rear-Impacted-Vehicle collisions: Frequencies and Casualty Patterns, Technical Report July 1975.
29. Epidemiology of motor vehicle collisions. (2010, May 26). In Wikipedia, The Free Encyclopedia Retrieved 11:52, September 24, 2010, from, http://en.wikipedia.org/w/index.php?title=Epidemiology_of_motor_vehicle_collisions&oldid=364314362
30. Rajaraman R., Analysis of Road Traffic Accidents on NH45, Kanchipuram District (Tamil Nadu, India). 4th

IRTAD CONFERENCE 16-17 September, 2009, Seoul, Korea.

31. M. Peden, , K. Oyebite, , J. Ozanne-Smith, , A.A. Hyder, , C. Branche, , F. AKM Rahman, , F. Rivara, ,K.

Bartolomeos World Report on Child Injury Prevention. (eds) Geneva, WHO Press, 2008. ISBN 978-92-4-156357-4

32. Rezapur-Shahkolai F, Naghavi M, Shokouhi M, Laflamme L. Unintentional injuries in the rural population of Twiserkan, Iran: a cross-sectional study on their incidence, characteristics and preventability. BMC Public Health; 2008; 8: 269

33. Al B, Yildirim C, Coban S. Falls from heights in and around the city of Batman. Ulus Travma Acil Cerrahi Derg 2009;15:141-7.

34. Hocking, M.A., Assaults in south east London. J R Soc Med, 1989. 82(5): 281-4.

35. Wright J, Kariya A: Assault patients attending a Scottish accident and emergency department. J R Soc Med, 1997; 90: 322-6

36. M. Garuar. MD,*. M Karbakhsh ,M.D., MPH*. M. R Zarei.M.D, Patterns of Assault: Experience from an Urban Hospital-based Study in a Developing Country.Medical journal of the Iranian hospital, 2004. 6(2): 50-54.

37. Borges, G., Orozco, R., Cremonte, M., Figlie, N.B., Cherpitel, C., Poznyak, V. Alcohol and violence in the emergency department: A regional report from the WHO Collaborative Study on Alcohol and Injuries. Salud Publica de Mexico (in press).

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