

*Original Article***Deaths Due to Electrocution- A Retrospective Study****Mohd Kaleem Khan¹, Umar Bin Abdul Aziz², Faiz Ahmad³**¹Assistant Professor, Dept. of Forensic Medicine and Toxicology, J.N.M.C., A.M.U., Aligarh,²Associate Professor, Dept. of Forensic Medicine, F. H. M. C., Etmadpur, Agra, ³Senior Resident Dept. of Forensic Medicine and Toxicology, J.N.M.C., A.M.U., Aligarh**Abstract**

Retrospective analysis of deaths because of electric shock from the medico-legal death records our college i.e. J.N.M.C., A.M.U., Aligarh, Uttar Pradesh, India. Most of the deaths were of men having the age in between 11-50 years. All deaths were inadvertent and most part of them were during the time of monsoon as compared to the deaths in western countries where, baths, warmers or hair dryers were the source of electric shocks. The death rate reported because of electric shock was 0.34 per lakhs (100000) of the population in the present study as against the figures of 0.94 and 0.14 from Bulgaria and Canada respectively. A large portion of the deaths were either prompt or quick. It implies that individuals living at home did not have basic knowledge of dangers of electric shock. In this way mindfulness about utilization of good quality electric machines is the need of great importance.

Key words: *Electrocution, Accidental Deaths, Burns***Introduction**

Invention of electricity is about 300 years old and also the mortality related to it.¹ With time, the inventions driven by electricity made the human life dependent on it. Ever increasing dependency on industry and domestic requirement of electricity is also exposing man to the injury by electric current itself and appliances running on it. The other source of such injury is lightning, which is life threatening due to the very high voltage content. An injury due to high voltage is morbid in nature due to instantaneous high energy production.²

National crime records bureau data showed 10218 deaths from electrocution and that constitute 2.6% of all the accidental deaths, of which 0.7% were by lightning, which forms about 2833 cases.³ Self electrocution in

India accounts for 0.7% of the total suicides, that is 952 out of 134799 suicide deaths in the year 2013.³

Materials and Method

The present investigation involves an examination of the Medico-Legal cases recorded during June 2015 to May 2018 (three years). A total of 62 cases of death due to electrocution were recorded in in the Emergency Section of J.N.M.C., A.M.U., Aligarh, Uttar Pradesh, India. We gathered the general data about these cases from the history, the police papers and death certificate. This data was then entered in a proforma made for this reason and there after examined.

Results

Males formed the most number of cases, 43 (69.35 %) and the remaining were females 19 (30.64 %). (Table 1)

On an average, we got 21 cases for each year. A large number of these cases, 30 (48.39 %), were found in the summer and rainy season i.e. during the months June, July and August. (Table2)

Corresponding Author:**Dr. Umar Bin Abdul Aziz**

Associate Professor, Department of Forensic Medicine, F. H. M. C., Etmadpur, Agra. Pin Code: 283202.

E-mail: umarbinabdulaziz@gmail.com

Mob. No. 9997046944

The age of death due to electrocution was spread over the year of 1 to 80 years, however the majority of them were in the age group of 11-50 years. (Table 3)

Most of the casualties occurred due to electric shock while they were working in their homes, 43 (69.35%) cases followed by on road cases i.e. 9 (14.51%) and industrial and other cases 5 (8.06%) each (Table 4).

In 24 cases (38.71 %), just entry marks were seen, while 18 cases (29.03 %) indicated both the entry and exit marks. In 6 cases (9.86 %), no marks were seen. In 7 cases (11.29 %), there were extra marks (non-electric shock wounds) were found. 7 cases (11.29 %) indicated burn on the body and clothes. (Table 5).

In 43 (69.35%) cases the surroundings were observed to be sodden or wet, while it was dry in 19 cases (30.65 %). (Table 6)

Table-1: Cases according to Sex

Sex	No.	%
Male	43	69.35
Female	19	30.65
Total	62	100

Table- 2: Cases according to Months / Year

Month	2015	2016	2017	No.	%
Jan	1	1	1	3	4.84
Feb	1	1	0	2	3.23
Mar	1	1	1	3	4.84
April	1	2	1	4	6.45
May	0	1	2	3	4.84
Jun	4	3	6	13	20.97
July	3	2	3	8	12.90
Aug	2	3	4	9	14.51
Sep	1	2	1	4	6.45
Oct	2	2	1	5	8.06
Nov	0	2	1	3	4.84
Dec	2	1	2	5	8.06
Total	18	21	23	62	100

Table 3: Cases according to Age

Age (Yr.)	No.	%
1-10	4	6.45
11-20	12	19.35
21-30	18	29.03
31-40	13	20.97
41-50	9	14.1
51-60	4	6.45
61-70	1	1.61
71-80	1	1.61
Total	62	100

Table 4: Cases according to Place of Incident

Place	No.	%
Domestic	43	69.35
Industrial	5	8.06
On road	9	14.51
Others	5	8.06
Total	62	100

Table- 5: Cases according to Types of Mark Present over the Body

Type of marks	No.	%
Entry mark	43	38.71
Entry and exit	18	29.03
Without marks	6	9.68
Additional marks	7	11.29
Burns	7	11.29
Total	62	100

Table- 6: Cases according to Surrounding of the Place of Incident

Surrounding	No	%
Wet	43	69.35
Dry	19	30.65

Discussion

Men formed the major junk of fatalities i.e. 43 cases (69.35%). This is in consistency with study 4, 5, 6, and 7. Most of our cases fell in the age range of 11-50 years

(83.87%). This is in consistency with other studies 4, 5, 6, and 7 however Rautji et al ⁶ and Dokov ⁷ have limited the age window period 21-40 and 25-44 years respectively. Age group between 0-10 years showed 4 (6.45%) cases. Few researchers have reported in this age group. Tirasci et al ⁴ reported 31.7%. In 0-10 years' age cases which are too high from our study.

In our study 24 (38.71 %) cases showed just entry marks, whereas both entry and exit marks were seen in 18 (29.03 %) cases. This is in contrast to the study done by Rautji et al ⁶ in India, which has very high incidence on entry wound mark 86.27 % where as they reported no case without an electrocution mark in caparison we have 9.68% cases without the mark. This could be as the result of wet skin with low resistance in rainy season, and such cases may result in negative autopsy. Flame burn or dry burn consisted about 11.29 % of cases and these are mainly due to high voltage burn.

The cases in in wet and moist condition are about 43 (69.35%) in the current study and most of the cases are in monsoon season. This may be attributed to poor maintenance and electric supply and poor housing infrastructure. This is consistent with the study 5 and 6. Study 4 and 8 mentioned more accident to home appliances and in bathroom settings where as in our set up it seems that faulty wiring and poor housing infrastructure have an effect on electrical injuries.

Conclusion

1. Most of the deaths were accidental,
2. Males were the predominant victims.
3. In the rainy season, more than 50 per cent deaths occurred.
4. Most of the deaths were either instantaneous or immediate.
5. Rate of fatality is significantly higher.

6. More deaths occurred in domestic surroundings. It signifies that people living at home did not have elementary knowledge of risks of electrocution.
- There is no conflict of interest among authors and funding source involved.
 - This paper has got all ethical clearance from the existing body of the college

References

1. Jex-Blake AJ: The Gulstonian lectures on death from electricity in the late nineteenth century, *Med Instrum.* 1975; 9:267.
2. Smith J, Rank BK. A case of severe electric burns with an unusual sequence of complications. *Br. J. Surg.*1946;33:365-68 [jalt10i3p248.pdf]
3. Accidental deaths and suicides in India 2013, National crime records bureau, Ministry of home affairs government of India, <http://ncrb.gov.in>. Accessed on 2nd June 2018
4. Tirasci Y, Goren S, Subasi M, Gjukan F. Electrocution related mortality: A Review of 123 Deaths in Diyarbakir, Turkey between 1996 and 2002. *Tohoku J ExpMed* 2006; (208): 141-45
5. Shrigiriwar M, Bardake R, Dixit PG. Electrocution: A six year study of Electrical Fatalities. *JIAFM* 2007; (29): 50-3
6. Rautji R, Rudra A, Behra C, Dogra TD. Electrocution in south Delhi: a retrospective study. *Med Sci Law* 2003;(43):350-2
7. Dokov W, Baltov M. A study of Fatal Electrical Injuires in Smolyan District. Republic of Bulgaria. Anil Aggrawal's Internet Journal of Forensic Medicine and Toxicology [serial online] 2009; (10): 6
8. Karger B. Electrocution – autopsy study with emphasis on —electrical Petechiel. *Forensic Sci International* (126): 210