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Epidemiology of childhood electrocution in Bangladesh: Findings of national injury survey

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ABSTRACT

To explore the epidemiology of childhood electrocution in Bangladesh, a population-based cross-sectional survey was conducted between January and December 2003. Nationally representative data was collected from 171,366 rural and urban households, comprising of a total population of 819,429.

The average incidence rate of non-fatal childhood electrocution was 53.2 per 100,000 population-year. The rate was found to be significantly higher ($p = .000$) among male children compared to the females which was 66.7 and 39.2 per 100,000 population-year, respectively. A significantly higher rate of electrocution was found in rural areas compared to urban ($p = 0.000$). The average child death rate due to electrocution was 1.42 per 100,000 population-year. More than two-thirds of the total childhood electrocution took place at home and 69% electrocution cases were from a domestic source of electricity.

Younger children, specifically males are more vulnerable to electrocution. Rural children are at higher risk compared to urban. Home is the most common place of childhood electrocution. A national strategy and prevention program is necessary to address morbidity and mortality of children due to electrocution.

1. Introduction

Electrical injuries continue to present problems with devastating complications and long-term socioeconomic impact [1]. Though the numbers of deaths reported from electrocution are relatively low electrocution does create a considerable amount of morbidity [2]. Although electricity is a relatively recent invention, humans have always been exposed to electrical injuries caused by lightning [3]. Nowadays electrical injury is increasingly becoming a significant health problem in Bangladesh, especially in rural areas due to the increasing uptake of electricity for agricultural development purposes.

The poor, illiterate people of rural Bangladesh are not aware of the safety measures to follow with using electricity or of the risk of electrocution. The magnitude of electrocution has never been documented in Bangladesh despite the fact that it creates considerable health consequences. Along with a poor record-keeping system, the extreme under utilisation of hospital services by the majority of the population means hospital records do not accurately reflect the electrocution situation of Bangladesh. Therefore there is not enough information to provide insight into the magnitude of the problem. This population-based survey study was designed to provide evidence on the epidemiology and some determinants

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of childhood electrocution in Bangladesh. This study also provides a basis for the prevention of electrocution.

2. Methods

2.1. Study design

Cross-sectional study.

2.2. Study population

The study was carried out during 2003 (January to December) in 12 randomly selected districts of Bangladesh and in Dhaka Metropolitan City. This encompassed a population of 819,429 among them 351,651 were children. In this study person less than 18 years were considered as children.

A multi-stage cluster sampling was used which resulted in a total sample size of 171,366 households; 88,380 from rural areas, 45,183 from district towns (urban areas) and 37,803 households from Dhaka Metropolitan City. The methodology of the study has been detailed elsewhere [4,5].

3. Definition of severity

Non-fatal electrocutions were separated in different degrees of severity. They were classified into severe, serious, major and moderate. The definitions are:

Moderate: Sought medical care, but not admitted to hospital; or had a 3-day work loss, or absence from school, but had no permanent disability. Three days was set as the minimum number following extensive discussions with social scientists and epidemiologists familiar with Bangladeshi cultural norms.

Major: Hospitalized, for a period of less than 10 days but no permanent disability.

Serious: Hospitalized for 10 days or more, but no permanent disability.

Severe: Permanently disabled (loss of vision, hearing, handling, ambulation, or mental retardation) regardless of whether hospitalization occurred.

Permanent disability was defined as any of the part of the body that losses its functional ability permanently.

3.1. Statistical analysis

Standard descriptive statistics were used to analyse the characteristics of electrocution patients and their injuries. Mean, standard deviation (SD) and proportion were used where appropriate.

The electrocution incidences were categorized according to gender, age and residence. The yearly incidence rate of electrocution illness was calculated from the number of occurrences of childhood electrocution morbidity in 6 months multiplied by two, as data was collected over a 6-month recall period. In the case of death rates no multiplication was required as it was a 1-year recall period. Rates were calculated with 95% confidence intervals (CI). Relative risk (RR) was calculated to compare the electrocution risk among gender and in different places of residence.

Table 1 – Determinants of sex and place of residence.

	Frequency	Rate	RR	*p* value
Place of residence				
Rural	161	82.3	4.75 (3.16–7.14	0.000
Urban	27	17.3		
Total	188	53.2		
Sex				
Male	119	66.7	1.70 (1.26–2.29)	0.000
Female	69	39.2		
Total	188	53.2		

Mortality and morbidity data were analysed separately.

4. Results

A total of 188 children were found to have suffered illness due to electrical injury. The rates of non-fatal and fatal electrical injury among children less than 18 years were 53.2 and 1.42 per 100,000 population-year, respectively. Among the children with non-fatal electrical injury 63.2% were boys and 36.8% were girls. The median age of suffering from non-fatal burn was 8 years and the mean age was 8.74 (SD $\pm$ 3.9) years, ranging from 2 to 16 years. About two-thirds of electrical injury incidences occurred among the age group of less than 10 years.

About 50% of the parents of those children were illiterate and more than 60% of those families earned less than USD 50 a month.

Overall the rate of non-fatal electrical injury among children in Bangladesh was 53.2 per 100,000 population-year. The risk was significantly higher for boys (RR 1.70; $p = 000$). Considering place of residence, rural children were found to suffer a risk of electrical injury five times greater (RR 4.75; $p = 0.000$) than their urban counterparts (Table 1).

The highest rate of electrical injury was found among the age group of 5–9 years being 86 per 100,000 population-year. The lowest rate was found among the age group 1–4 years. Considering all ages together (<18 years) the rate of electrical injury was significantly higher among the boys. Though the rate was higher among the girls of 15–17 years the difference was not significant (Fig. 1).

The major risk of childhood electrical injury came from the electricity supply in the home. This constituted about 69% of

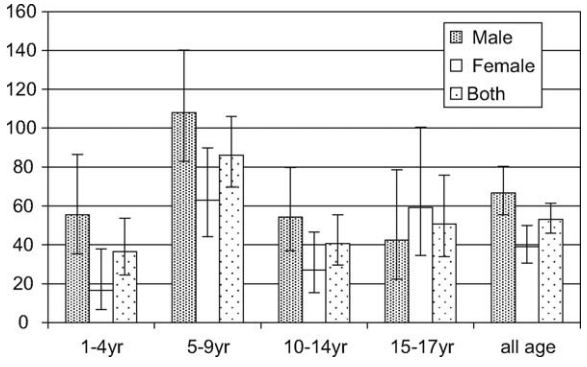

Fig. 1 – Distribution of illness due to electrocution by age and sex (per 100,000 population-year).