

Child victims in medico-legal autopsy

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Abstract

Introduction : Death of a child, particularly a sudden death is an essentially a tragic experience for parents, caregivers and the general public. Medico-legal autopsy is an important solution in many unanswered questions that arises after death. Accurate information about childhood deaths is obligatory to improve child survival.

Objective: The aim of the study was to determine the distribution and pattern of various causes of death among the medico-legal autopsy population and to assess the areas where interventional and preventive strategies can be taken place.

Study Design: Retrospective descriptive study was done based on reports of post mortems performed on children during past 3 years. The information was gathered on a proforma to fulfill the objectives. The data was analyzed using SPSS statistical package.

Results: Majority of children were of the age group of less than 1 year (40%). 49% of the circumstances were unnatural while accidents amount to 39%. Most frequent mechanism of death was asphyxia (31%). Almost 53% of them were caused by mechanical asphyxia due to drowning. There was a significant difference in circumstances of death in infants, children between 1-10 years and those aged over 11 years. Death due to natural conditions was predominant among infants (75%), while 58% of the children aged between 1-10 years died of accidental causes. 56% of children over 11 years died of accidental causes while 16% found to be suicides. 54% incidents of unnatural deaths had taken place at home.

Conclusion: Accidental deaths were common among children older than 1year of age while drowning was identified as the leading unnatural cause of death which can be prevented easily. It is high time we consider some precautions and regulations to protect children against accidents, injuries and hazards.

Keywords: child death, autopsy, accidental deaths

Introduction

Over 10 million children aged less than 5 years die every year all over the world. [1]. Death of a child, particularly a sudden death is an essentially a tragic experience for parents, caregivers and the general public. Bereaved parents expect appropriate, thorough, and sensitive investigations to identify the medical causes of such deaths. A death of a single child can result in calls for extensive child welfare reform.

[2, 3] Medico-legal autopsy is an important solution in many unanswered questions that arises after death.[4,5]

Information revealed after child death reviews addressing a wider context is obligatory to improve child survival and to strengthen the child welfare services[6]. Data about causes, circumstances and distribution of childhood death vary from country to country and,

therefore, it is clear that review into the patterns in our own country is essential to

suggest more effective precautions/ preventive measures.

Objective

The aim of the study was to determine the distribution and pattern of various causes of death among the medico-legal autopsy population and to assess the areas where interventional and preventive strategies can be taken place.

Method

Retrospective descriptive study was done based on reports of post mortems performed on 98 children aged 1 day to 18 years during last consecutive 3 years referred to a tertiary care hospital. Neonatal deaths associated with complications of birth asphyxia were excluded from the study. The information was gathered on a proforma to fulfill the objectives. The data was analyzed using SPSS statistical package.

Results

Out of 98 case records analyzed, majority of children n- 39 (40%) were of the age group of less than 1 year. There were n-25 (25%) of 1-10 years and n-34 (35%) of 11 to 18 years. n-50 (51 %)of the circumstances were natural while there were n- 39 (40%) of accidents, n-6 (6%) of suicides and n- 3 (3%) of homicides (Table 1). n- 15 (38 %) of the accidents were drowning while there were n-9 (23%) of accidental head injuries and n-7 (18 %) of accidental aspirations which were seen among infants. Among the suicides n-5 (83%) was due to hanging. Causes of death in homicides were drowning, blunt head injury and sharp force trauma. n-30 (60 %) of the natural deaths were due to respiratory and other infections.

Table 1- Alleged Circumstances and causes of death

Circumstances	Number	Percentage	COD	Number	percentage
Accidental	39	40%	Drowning	15	38%
			Aspiration	7	18%
			Other asphyxia	2	5%
			Blunt head injury	9	23%
			Other(Poisoning/burn/snake bite/blunt chest)	5	13%
			Sharp force injuries	1	3%
Suicidal	6	6%	Hanging	5	83%
			Poisoning	1	17%
Homicidal	3	3%	Drowning	1	33.3%
			Sharp force injury	1	33.3%
			Blunt head injury	1	33.3%
Natural	50	51%	Respiratory pathology	14	28%
			Congenital heart disease	11	22%
			Other congenital	9	18%
			Other infections	16	32%

There was a significant difference in circumstances of death in infants, children between 1-10 years and those aged over 11 years (p value 0.0037 and 0.000 as seen in the table 2 & 3).

Table 2- Difference of circumstances between groups (Infants and 1-10 years)

Age group	No	No	Percentage	P value	
0-1 year	39	Accidents	7	17%	0.0037
		Homicides	2	08%	
		Natural	30	75%	
		Suicides	0	00%	
1-10 years	25	Accidents	14	58%	
		Homicides	1	04%	
		Natural	10	38%	
		Suicides	0	00%	

Table 3- Difference of circumstances between groups (Infants and 11-18 years)

Age group	No	No	Percentage	P value	
0-1 year	39	Accidents	7	17%	0.000
		Homicides	2	08%	
		Natural	30	75%	
		Suicides	0	00%	
11-18 years	34	Accidents	18	56%	
		Homicides	0	00%	
		Natural	10	28%	
		Suicides	6	16%	

Death due to natural conditions was predominant among infants n-30 (75%), while n-14 (58%) of the children aged between 1-10 years and 56% of children between 11-18 years died of accidental causes. (Table 4) N-6 (16%) of deaths among the age group 11-18 years were suicides while there were no incidents of suicides among the younger age groups.

Table 4- Circumstances according to the age group

Age group	No	No	Percentage	
0-1 year	39	Accidents	7	17%
		Homicides	2	08%
		Natural	30	75%
		Suicides	0	00%
1-10 years	25	Accidents	14	58%
		Homicides	1	04%
		Natural	10	38%
		Suicides	0	00%
11-18 years	34	Accidents	18	56%
		Homicides	0	00%
		Natural	10	28%
		Suicides	6	16%

Once the natural deaths were excluded there was a significant difference in the circumstances of death among the age groups of 0-10 years and 11-18 years (P value 0.0035). n-6 (25 %) of unnatural deaths of 11-18 years were suicides. (Table 5)

Table 5- Difference of circumstances of unnatural deaths (age groups less than 10 and 11-18)

Age group	No		No	Percentage	P value
0-10 years	24	Accidents	21	87%	0.0035
		Homicides	3	13%	
		Suicides	0	0%	
11-18 years	24	Accidents	18	75%	
		Homicides	0	0%	
		Suicides	6	25%	

Most frequent mechanism of death once natural deaths excluded was asphyxia n- 30(63 %). N-16 (53 %) of them was caused by mechanical asphyxia due to drowning. There were n- 7 (23%) of aspiration related deaths and 2 other asphyxial deaths which include a case of traumatic asphyxia and a case of choking. (Table 6) The analysis of the locus of the unnatural death revealed that just a little above half of the deaths occurred at home (54%) followed by 23% at road & other places. (Table 7)

Table 6- Mechanism of death (unnatural circumstances)

Mechanism	Number	Percentage	COD	Number	Percentage
Mechanical asphyxia	30	63%	Drowning	16	53%
			Aspiration	7	23%
			Hanging	5	17%
			Other	2	7%
Other	18	27%			

Table 7- Locus of the incident unnatural deaths

Locus of incident	Circumstances	Number	Percentage
Home	Accident	17	54%
	Homicide	3	
	Suicide	6	
Road	Accident	11	23%
	Homicide	0	
	Suicide	0	
Other	Accident	11	23%
	Homicide	0	
	Suicide	0	

Out of 16 children who died of drowning 7 (44%) incidents had occurred within the home while 9 (56%) incidents were outside in lakes, rivers, ponds and wells.

Discussion

Child mortality review is extremely important in prevention of deaths among children.[7] This study on a sample of all the children subjected to medico-legal autopsy during a period of consecutive 3 years other than for birth related reasons in a Teaching Hospital in Sri Lanka revealed many interesting findings.

The sample can be taken as a representative sample of whole country with certain limitations including sample size and study population which was selected from a single teaching unit. Among the analyzed 98 cases majority 40% were infants. Forensic autopsy study on sudden unexpected deaths of children in Turkey revealed that 69% of the children were less than 1 year of age. [8]

Sudden unexpected natural deaths occur throughout childhood but most commonly in infants and toddlers between 1-4 years [9, 10]. On the other hand, sudden unexpected deaths among children often lead to a medico-legal autopsy irrespective of the circumstances. Majority of sudden deaths among infants are natural. [11] This explains the presence of the highest percentage of (75%) natural deaths among the infants in our study who underwent medico-legal autopsies. Furthermore, natural deaths amounted to 51% of circumstances of the total sample. Respiratory and other infections remained as the major (60%) cause of death among them. Respiratory diseases have been identified to cause 80 percent of the unexpected deaths in infants.[10] However, since our sample is only on the cases subjected to medico-legal autopsies, clinically diagnosed respiratory infections with no medico-legal relevance are not included.

When preventive strategies are concerned it is extremely important to evaluate the distribution of accidental deaths among

children. Accidents are the major cause of morbidity and mortality in children worldwide. 40% of the group died of accidental injuries while there were almost equal proportions (more than 50%) of accidental deaths among the age groups 1-10 years and 11-18 years. Accidental deaths among infants were 17% and all were due to accidental aspiration.

In a study on home related accidents in India, during infancy accidental falls found to be the major reason while there were 11% of accidental aspirations. [12] In our study drowning amounted to a striking proportion of accidental deaths (38%) among children followed by blunt head injury (23%). Major cause (44%) of the child accidental deaths in Australia was motor vehicle accidents followed by drowning (29%). [13] Drowning is the second leading cause of accidental injury-related death among children ages 1 to 14 being second to motor vehicle related accidents and the leading cause of accidental injury-related death among children ages 1 to 4 worldwide. [14] Higher proportion of drowning among our study group indicates lack of supervision of children when they are in water. However, further studies including all the provinces are necessary to clarify this.

When the circumstances were compared according to the age groups, there was a significant difference between the infants Vs children of 1 -10 years and infants Vs children of 11-18 years. Natural deaths predominates in infancy (75%) while accidents (56- 58%) were the major killer in the medico-legal autopsy population of children over 1 year. Similar results have been shown in studies conducted worldwide which shows an increase of number of accidents with age. [15,16,17,18]. Victims of homicides were younger children where 2 were of the age group of infancy and the 1 of 1 to 10 years age. Drowning, blunt head injury and sharp force trauma were the 3 homicidal causes of death. Suicides were only seen among the

10 to 18 year age group. This pattern can be explained from the increasing independency of the children with age.

Once the natural deaths were excluded there was a significant difference in the circumstances of death between the ages less than 10 years and 11-18 years. This can be explained from the presence of suicides among the older children which was absent in the young. Suicide has become a common cause of death among adolescent and young children worldwide.[15] However, suicides were very low in younger children and if present they may have been labeled as accidents. One explanation for this pattern is having more freedom to the teenagers due to maturity. The study revealed that 83% of suicides were due to hanging. Hanging has been identified as the commonest method of suicide among young children in India. [15, 16]

The commonest mechanism of death in the unnatural group was asphyxia (63%) which can be explained from the high rate of drowning. 54% of the unnatural deaths have taken place at home. Among these there were 7 cases of drowning which amounted to 44% of the total drowning incidents. In a study on childhood accidental deaths it was revealed that majority had occurred at or near the home. [17] This clearly shows lack of proper supervision to children even at their own home and stresses importance of targeting home environment in order to prevent such deaths.

There were several limitations to the current study. The sample which was taken from a single teaching unit may not represent the national pattern and distribution. When child health epidemiology is of concern not only the victims of medico-legal autopsies but a complete picture of child deaths are important. However, sudden deaths associated with injuries and violence are easily preventable and such victims are subjected to medico-legal autopsies.

Conclusions and suggestions

Understanding the nature and circumstances of childhood accidents can assist accident prevention strategies and programs. The study revealed that accidental deaths were commonly seen in the children more than 1 year of age while drowning was identified as the commonest accidental cause of death followed by blunt head injury. There was a trend in suicide among the children Of 11-18 years. Most unnatural deaths had taken place at home indicating lack of adequate parental supervision. We recommend effective health education programs to general public as well as implementation of suitable legislations on child protection to improve child survival effectively.

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Author Contribution

- Design to the study -, IDGK, PASE, TR
 Supervision to the study- IDGK
 Analysis of the data- IDGK,TR
 Interpretation of the results- IDGK, PASE
 Writing the manuscript - IDGK
 Revising the manuscript- PASE, IDGK