

DEATHS RELATED TO FALLS FROM THE SAME LEVEL IN CHILDREN AND ADOLESCENTS

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Abstract

Mortality due falls from the same level in children and adolescents continue to be a constant topic of concern and anxiety.

Over a decade in the Department of Forensic Medicine of Bihor County 7132 autopsies were performed. Of these, 26 were cases of child deaths related to falls from the same level (0.95%). Autopsy protocols and the circumstances in which injuries and deaths occurred were reviewed. Lethality index recorded during 2003-2012 was 1.33%. Most deaths were registered in 2002 and 2003; conversely no deaths were recorded in 2010. Lethality index proved no differences related to gender. The most affected age group was 6 to 10 years, but the lethality index was highest in the age group 4-6 years. Children in rural areas had a higher rate of mortality than those from the urban environment. Deaths were more numerous in children from families with average socio-economic and educational status, the majority having parents with secondary education. Most deaths and the highest lethality were recorded during summer (42.31%) and winter (38.46%); most deaths occurred on weekends.

Deaths related to falls on the street had the highest frequency. Most deaths occurred after falls on concrete or stone. 84.62% of the deaths were caused by head trauma. The time interval between injury and death was shorter than 24 hours in 92.31% of the cases. Knowledge of thanatological factors is important in order to establish preventive measures.

Key words: falls from the same level, deaths, children

INTRODUCTION

Deaths related to falls from the same level have a very specific place, playing a certain role.

MATERIAL AND METHOD

During 2003-2012 the Department of Legal Medicine Bihor performed 7132 autopsies. Of these 26 were cases of child deaths related to falls from the same level (0.95%). The authors researched autopsy protocols, clinical documentation of the cases that was hospitalized before death and records of familial, social and criminal inquiries.

RESULTS AND DISCUSSIONS

Most deaths produced by falls from the same level were recorded in 2003 and 2004; in exchange in 2010 no similar deaths were registered.

Lethality index related to falls from the same level in children was 1.33% during 2003-2012. Lethality ranged from 2.44% (2007) and 0.92% (2006). Lethality index has a sinusoidal evolution, ascending until 2007 and decreasing afterwards.

Mortality related to falls from the same level was 2,59‰, with two peaks: in 2003 (3,69‰) and 2005 (3,90‰).

Table 1

Annual distribution of deaths and mortality related to falls from the same level in juveniles

Year	No. of deaths	%	Lethality index (%)	Mortality (‰)
2003	4	15,38	1,70	3,69
2004	2	7,69	1,23	1,90
2005	4	15,38	1,74	3,90
2006	2	7,69	0,92	1,98
2007	3	11,54	2,44	3,02
2008	2	7,69	1,08	2,03
2009	3	11,54	1,63	3,08
2010	0	0,00	0,00	0,00
2011	3	11,54	1,43	3,10
2012	3	11,54	1,55	3,12
Total	26	100,00	1,33	2,59

The majority of deaths was recorded among male gender with a ratio M/F = 2.25/1. Lethality index was slightly higher in boys than in girls (1.44% vs. 1.13%, $p = 0.327$). The risk of death in children with injuries from falls on the same level is 1.3 times higher in boys than in girls (RR = 1.271, RA = 0.003).

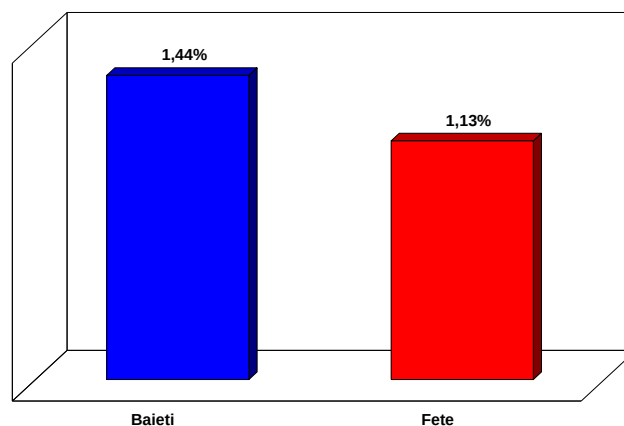


Figure 1 Lethality index related to gender

Most deaths occurred in children aged 7-10 years (42.31%), while in infants no deaths were registered. The maximum lethality index was recorded in the age group 4-6 years (2.15%), followed by the age group 7-10 years (1.93%), significantly higher compared to the age groups 11-16 (0.93%) and 1-3 years (0.48%) ($p < 0.001$).

The risk of death in children with injuries from falls on the same level is 2.7 times higher in the 4-10 years group of age than in the other groups (RR = 2.669, RA = 0.013).

Table 2

Distribution by age groups of deaths and mortality related to falls from the same level in juveniles

Age	No. of deaths	%	Lethality index (%)	Mortality (‰)
Infants	0	0,00	0,00	0,00
1 - 3 years	1	3,85	0,48	0,80
4 - 6 years	7	26,92	2,15	3,74
7 - 10 years	11	42,31	1,93	4,32
11 - 16 years	7	26,92	0,93	1,88

There were more deaths among children from rural areas (53.85%) with an R/U ratio of 1.21:1.

Lethality index related to falls from the same level was significantly higher in rural areas than in urban areas (1.75% vs. 1.03%, $p = 0.052$). The risk of death by falling from the same level is 1.7 times higher in rural areas than in urban areas (RR = 1.690, RA = 0.007).

Table 3

Distribution of deaths and mortality related to falls from the same level in children accordingly to environment

Environment	No. of deaths	%	Lethality index (%)	Mortality (‰)
Urban	12	46,15	1,03	2,65
Rural	14	53,85	1,75	2,55

Most deaths occurred in children from families in which parents had secondary education (53.85% mothers, respectively 42.31% fathers), following families with illiterate parents or elementary education, completed or not (26.92% mothers, respectively 30.77% fathers).

Table 4

Death distribution related to parental education

Education	Mother			Father		
	No. of deaths	%	Lethality index (%)	No. of deaths	%	Lethality index (%)
Illiterate/ Elementary	7	26,92	1,03	8	30,77	1,58
Secondary education	14	53,85	1,36	11	42,31	0,94
Higher education	5	19,23	2,25	7	26,92	2,81
Undefined	0	0,00	0,00	0	0,00	0,00

Predominantly, deaths occurred among children from families with average socio-economic status (42.31%).

Table 5

Deaths distribution related to familial socio-economic status

Socio-economic status	No. of deaths	%	Lethality index (%)
High	7	26,92	3,13
Average	11	42,31	1,00
Low/limit of poverty	8	30,77	1,25

At a rate of 38.45% victims had pre-existing pathology. Lethality index was significantly higher among children with pre-existing pathology than in those without (9.80% vs. 0.86%) ($p < 0.001$). The risk of death among children with injuries from falls from height and pre-existing pathology is 11.4 times higher than in children without pathology (RR = 11.391, RA = 0.189).

Table 6

Deaths distribution related to pre-existing pathology

	No. of deaths	%	Lethality index (%)
Pre-existing pathology present	10	38,45	9,80
Neuromotor abnormalities	4	15,38	18,18
Mental retardation	1	3,85	3,45
Sensorial disabilities	3	11,54	8,57
Intercurrent acute febrile illness	2	7,69	12,50
Pre-existing pathology absent	16	61,54	0,86

Most deaths produced by falls from the same level were recorded in February, July and August. In April and November there was no juvenile death by falling from the same level.

Highest lethality was recorded in February (2.70%), followed by October (2.17%), July (2.15%) and August (2.04%).

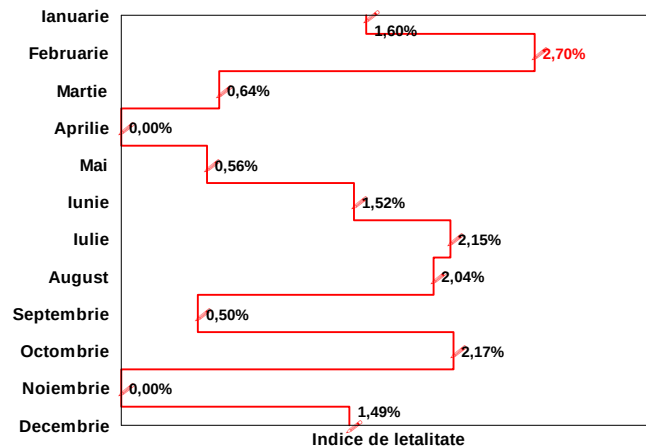


Figure 2 Monthly evolution of lethality

Most deaths were recorded during summer (42.31%) and winter (38.46%) and the least in spring (7.69%).

The lethality was higher in the summer (1.90%), slightly greater than in the winter (1.86%) ($p = 0.704$) but significantly greater than in the fall (0.80%) and the spring (0.43%) ($p < 0.001$).

Most deaths related to falls from the same level were recorded over the weekends, 15 cases representing 57.69% of all deaths.

Highest lethality was recorded on Mondays (2.21%), followed by Sundays (2.11%) and the lowest mortality was recorded on Wednesdays (0.41%).

Table 7

Weekly distribution of deaths and lethality related to falls from the same level in juveniles

Weekday	No. of deaths	%	Lethality index (%)
Monday	4	15,38	2,21
Tuesday	3	11,54	1,35
Wednesday	1	3,85	0,41
Thursday	3	11,54	1,12
Friday	6	23,08	1,44
Saturday	5	19,23	1,14
Sunday	4	15,38	2,11

Depending on the place where the fall from the same level occurred, deaths result especially after crashes in the street (38.46%), followed in equal percentages by accidents produced during trips out of town, garden, yard and sports hall activities (11.54%).

The lethality index was the highest when falling from the same level happened in the street (14.93%), followed by garden accidents (2.00%).

Table 8

Deaths distribution depending on accident site			
Accident site	No. of deaths	%	Lethality index (%)
Flats	1	3,85	0,64
Trips out of town	3	11,54	1,24
Garden	3	11,54	2,00
Backyard	3	11,54	1,96
Ski slope	2	7,69	1,85
Kindergarten/school	1	3,85	0,85
Gym	3	11,54	0,69
Street	10	38,46	14,93

Depending on the contact surface deaths occurred mostly after falling on cement or stone (34.62%). Lethality index was 11.25% for the stone impact and 6.04% on cement, respectively.

Table 9

Deaths distribution depending on the contact surface			
Contact surface	No. of deaths	%	Lethality index (%)
Ground	2	7,69	0,81
Wood, floor	1	3,85	0,48
Polyurethane coatings	2	7,69	1,03
Snow/ice	2	7,69	0,67
Cement	9	34,62	6,04
Tiles	1	3,85	1,10
Stone	9	34,62	11,25

Distribution of deaths by the circumstances of the fall indicates that 38.46% of deaths were due to pushing of the child, and 30.77% were the result of the victim's own fault. A significant percentage, 22.08%, is the consequence of sporting activities.

Table 10

Deaths distribution depending on the accidents circumstances		
Circumstances	No. of deaths	%
Own fault	8	30,77
Pushed child	10	38,46
Consequence of environmental events	1	3,85
Physical abuse	1	3,85
Winter sports	3	11,54
Team sports / training	3	11,54

Head injury represented the leading medical cause of death in 86.42% of the accidents by falling from the same level.

Table 11

Distribution of accidents by fall from the same level related to cause of death		
Cause of death	No. of deaths	%
Head trauma	22	84,62
Spine fracture	1	3,85
Multiple costal fracture with hemo-pneumothorax	2	7,69
Sternal trauma with aortic rupture	1	3,85

The interval between injury and death was less than 24 hours in 92.31% of the time. Only one case survived more than 7 days.

CONCLUSIONS

Every death related to falls from the same level must be analysed in terms of all its components: demographic, social and medical. In this way important data and great experience is gained, which will prove extremely useful for developing preventive strong measures at all levels.

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