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Forensic epidemiology of childhood deaths-Gaziantep (2005-2012)

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Abstract
In the present study, judicial death cases during childhood were assessed retrospectively for description and discussion of the data obtained in company with the literature were aimed. For the purposes of this study, the postmortem examination and post-mortem records of the cases between the ages of 0-18, who had died between January 2005 and December 2012. The sociodemographic characteristics and origin of the 1113 cases, the type of the incident, the distribution of the causes of death post-mortems were evaluated. The mean age of the 1113 cases was 6.77±0.17 (mean ± SE), and 66.8% cases were male, while 33.1% were female, (Male/Female: 2/1). The greatest part of all the deaths comprised fatal accidents with cases 61.4%, followed by (26.1%) suspicious deaths, 4.3% homicides, and 4.1% suicides the most common cause for death was detected as traffic accident by 33.5% cases among the 48 cases who were homicided, 58.3% were in the 15-18 age group. Consequently, it was observed that child death cases occurred in our territory were frequently accidental and traffic accidents were more common.

Keywords: Childhood, forensic death, accidents, suicide

Introduction and Objective

The Children's Bill of Rights recognized childhood as the period of life from birth until the age of 18, and provide that children should receive special care and protection [1]. Thanks to the developments in healthcare, mortality rates due to illnesses are observed to diminish worldwide. However, high morbidity and mortality rates due to injuries continue to be a public health issue regardless of the level of development of the countries [2].

The World Health Organisation has defined injury as "a sudden and unexpected incident that occurs involuntarily and causes physical and/or psychological damage" [3]. The accidents caused due to the physical weakness, small stature, and the lack of experience and coordination during childhood and adolescence increase the risk of injury and death [4]. It was reported in USA that 50% of death cases occurred between 1 and 24 years of age and 71% of the cases between 15 and 19 years of age were caused by the accidents [5].

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In line with the other countries around the world, injuries are among the most common causes of death in children and adolescents after the first few months of life in Turkey [6]. The most frequently reported types of accidents during childhood are traffic accidents, drowning and burns [5,7]. The child such protection and care as is necessary for his or her well-being, taking into account the rights and duties of his or her parents, legal guardians, or other individuals legally responsible for him or her, and, to this end, shall take all appropriate legislative and administrative measures [8].

The type of the childhood injury depends on the region (urban/rural) and the socioeconomic status [9]. The population was detected as 1,799,558 in 2012 whereas population between 0 -19 age group was 701,364 in 2007 and 791,143 in 2012 [10]. In the present study, judicial death cases during childhood were assessed retrospectively for description.

Material and Method

For the purposes of this study, the postmortem examination and post-mortem records of the cases between the ages of 0-18, who had died between January 2005 and December 2012, were retrieved from the archives of the Gaziantep Chief Public Prosecutor's office subsequent to the

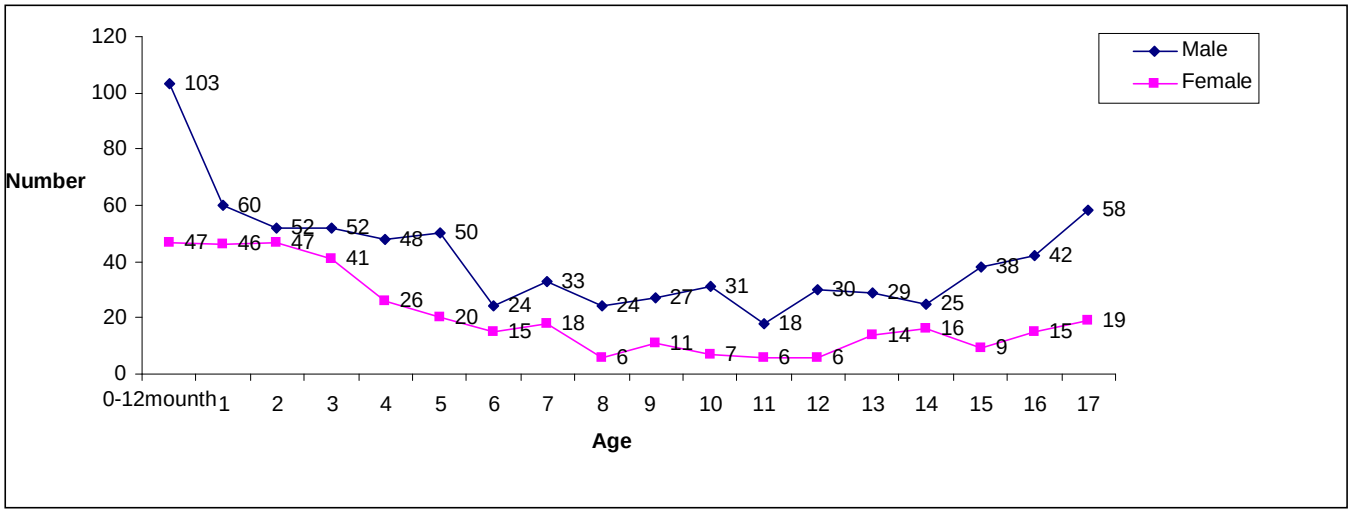
obtainment of the legal permission. The sociodemographic characteristics and origin of the 1113 cases, the type of the incident, the distribution of the causes of death post-mortems were evaluated. The obtained data were statistically analysed using the SPSS 18.0 software package and the results were presented in number and percentages.

Results

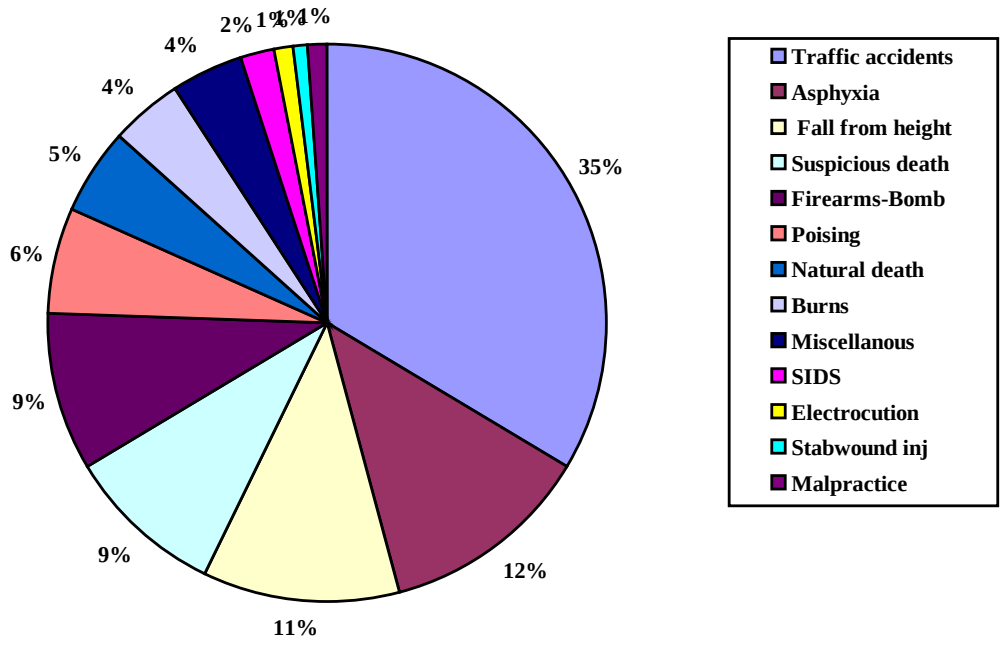
Between January 2005 and December 2012, a total of 4410 corpse examinations and postmortem were conducted in the provincial centre of Gaziantep and 1113 (25.2%) among these were performed on children.

The mean age of the 1113 cases was 6.77±0.17 (mean ± SE), and 744 (66.8%) cases were male, while 369 (33.1%) were female, (Male/Female: 2/1). Among these, 150 (13.5%) of the medico-legal deaths had occurred in children below 1 year of age (Graph 1). In terms of the age groups, the majority of the deaths had occurred in the 1-4 years' group with 382 (34.3) cases.

Graph 1. Distribution of all child death cases according to age



The most common cause for death was detected as traffic accident by 373 (33.5%) cases. (Graph 2).



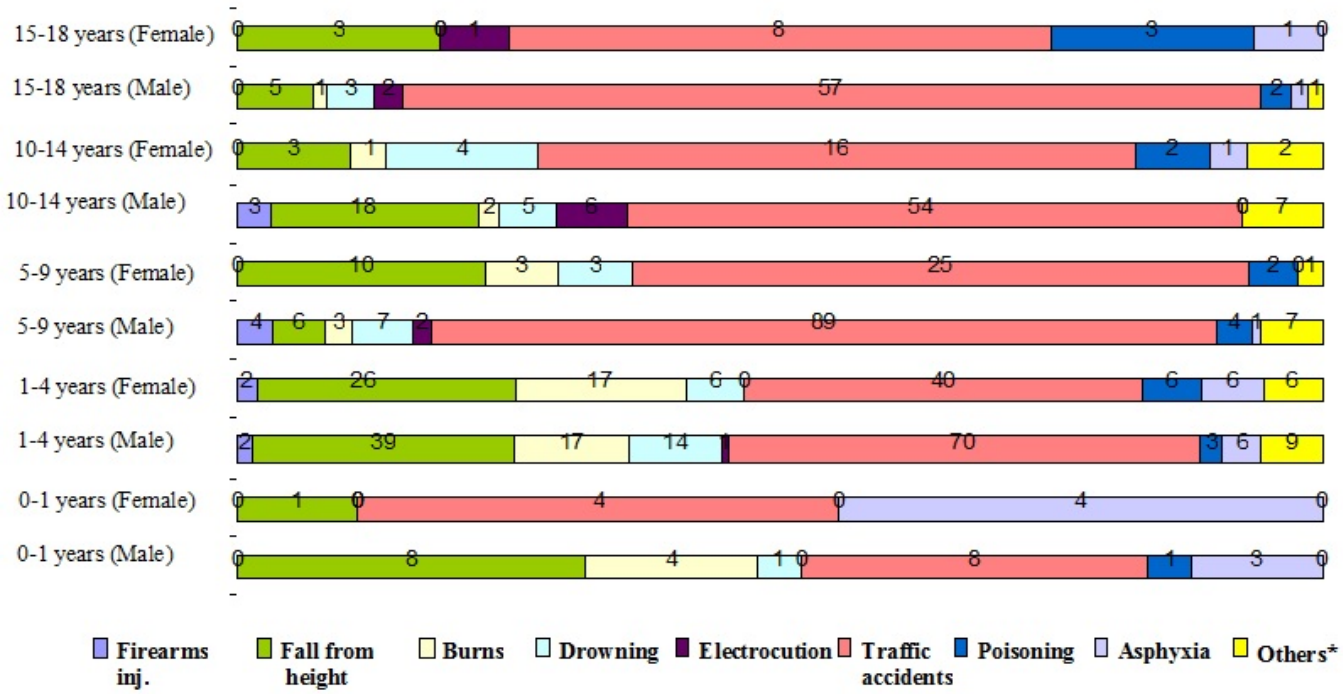
Graph 2. Cause and manner of death: all death cases

The greatest part of all the deaths comprised fatal accidents with 683 cases (61.4%), followed by 290 (26.1%) suspicious deaths, 48 (4.3%) homicides, and 46 (4.1%) suicides. Forty-six children (4.1%) had died due to the civil war in Syria. The causes of death according to the age groups are presented in Table 1.

Table 1. Causes of death according to the age groups

Manner of Death	Age groups					
	0-1 age	1-4 age	5-9 age	10-14 age	15-18 age	Total
Accident	34(5,0%)	270(39,5%)	167(24,5%)	124(18,2%)	88(12,9%)	683(100%)
Suspicious death	99(34,1%)	105(36,2%)	30(10,3%)	28(9,7%)	28(9,7%)	290(100%)
Homicide	6(12,5%)	2(4,2%)	5(10,4%)	7(14,6%)	28(58,3%)	48(100%)
Suicide	0	0	5(10,9%)	14(30,4%)	27(58,6%)	46(100%)
Other*	1(2,2%)	3(6,5%)	21(45,7%)	10(21,7%)	11(23,9%)	46(100%)
Total	140	382	228	182	181	1113

*Children who died due to the civil war in Syria.



Graph 3. Distribution of accidents by age groups and gender

Among the 63 cases who had died of poisoning, 30 (47.6%) were affected from carbon monoxide, 8 (12.6%) were poisoned with pesticides, 5 (7.9%) had ingested poisonous mushrooms, and 4 (6.3%) had died due to medicines or scorpion stings.

Among the 48 cases who were homicided, 28 (58.3%) were in the 15-18 age group. Twenty-nine of the homicided cases (60.4%) had died due to gunshots, 15 (31.3%) homicides were committed with sharp objects and 4 (8.3%) were strangulated with a pillow.

Out of the 46 cases who had committed suicide, 26 (56.5%) were between the ages of 15 and 18, while 13 (28.3%) were aged 10-1. Among these, 25 (54.3%) had died by hanging, 12 (26.1%) had died due to gunshot wounds, 6 (13.0%) were poisoned, and 3 (6.5%) had died by falling.

It was detected that 369 (54.0%) of 683 cases who have died as a result of accident died because of traffic accident and 270 (39.5%) cases have been between 1 and 4 years old (Graph 3).

Fifty-nine of all the cases had died due to natural causes. Among these, 13 were in the 0-1 year age group and the most frequent cause of death in this group was respiratory disease (pneumonia). In the 1-4 year age group, 21 cases had died of natural causes and the cause of death was respiratory disease (pneumonia) in 7 cases and infections of the central nervous system in 6 cases. In the other age groups, respiratory disease (pneumonia) as the most frequently observed cause of death.

Death due to asphyxia was most commonly observed in the 1-4 year age group. In 30 out of the 53 cases, the cause of death was the aspiration of food or gastric content, while death by drowning was observed in 23 cases. The causes of

death were aspiration of food or gastric content in 27 cases out of 28 cases (20.0%) in the 0-1 year age group, while drowning was observed in 13, hanging in 3, and food aspiration was found in 1 out of the 17 cases in the 5-9 year age group. In the 10-14 year age group, the causes of death were hanging in 9 cases, drowning in 6, and food aspiration in 1 out of the 16 cases. In the 15-18 year age group, death by hanging was observed in 16, drowning in 5, and food aspiration was found in 1 out of the 22 cases.

Forty-six children (4.1%) had died due to the civil war in Syria. Dead children included 32 (69.6%) boys and 14 (30.4%) girls; age average was 9.54±066 (min:3, max:17); autopsy was performed on 40 (87.0%) cases and one or more shrapnel or bullets were detected in the X-Ray in 15 (32.6%) cases before the autopsy. Multiple firearm – shrapnel injury was detected in 31 cases whereas firearm or shrapnel hit head as well as multiple parts of the body in 37 cases; the most common cause of death was detected as cerebral tissue damage and cerebral hemorrhage.

Discussion and Conclusion

In the present study, 4410 medicolegal deaths occurred in our territory within a 8 year period included 1113 (25.2%) medicolegal deaths occurred during childhood and male gender was more than female gender. Female/Male: 1/2. Age average was detected as 6.7. It was reported in the previous studies that female/male ratio was 1/2.6 (12), 1/2.3 (15) and male gender was more than female gender [11-15]. Age average was reported as 7.6 (11); 9.2 and 6.5 in males and females, respectively.

When it is compared with national and international studies, this may be explained with the fact that men are exposed to trauma more as a result of participation into social activities more and existing in the outer environment [16-20].

It was determined that deaths mostly occurred within the first 12 months (13.5%) (Graph 1) and in the 0-4 age group according to the age groups (34.3%); male gender was more than the female gender in all age groups and most common cause for deaths was accidents (61.3%). These findings were consistent with the data obtained by national and international studies conducted on childhood deaths [21-23].

In our study, crime scene investigation, eye witnesses and deceased examination-autopsy reports were considered for detection of the origin of medico-legal deth cases. According to this, deaths occurred as a result of accident (%61.4) are in the first rank among medico-legal death cases. In other studies, accidental deaths were reported as 50.7% [11], 47.3% [12], 42.2% [24], respectively.

Among death cases due to accidents in both genders, traffic accidents (motor vehicle accident, cyclist accidents, pedestrian accidents) were the first (54.0%) and most in male gender (24.1%) in 5-9 age group (30.8%) (Graph 3). In a similar study, such rates were reported as 23.1%, 30.5% in 5-9 age group and 23.3% in male gender [12]. In the other studies, deaths as a result of accident have been the least in 5-9 years age group [25].

It was detected in our study that falling from high was in the 3rd rank (11.4%) among medicolegal death cases. Among such falling cases, 119 (17.4) cases have fallen as a result of accident whereas 65 (54.6%) cases have been in 1-4 age group. Similar studies reported that accidental falling from high have been 15.4% and as 39.5% in 1-4 age group [12]. Agren et al. have reported that deaths because of falling from high following asphyxia are more frequent among the children after 1 year of age [26]. Yaycı et al. have reported deaths due to falling from high as 23.9% in the children after 1 year [12].

We have detected in our study that there were 136 (12%) death cases because of asphyxia and 63 (46.3%) of these cases were accidental. The most common asphyxia cases were detected as aspiration of the gastric content (formula aspiration during the first 12 month-period)-foreign body with 60 (44.1%) cases, drowning in water (pond, pool, bucket full with water at home) with 48 (35.2%) cases and hanging with 28 (20.5%) cases.

It was reported in the studies that deaths due to drowning in water and burn increased [4,7,27] and the secondly most common cause for childhood deaths was drowning in water [27]. The most common cause for death in children after 5 years was reported as drowning in USA and Australia [28,29].

Cordelia et al. have reported that among 140 death cases, 37 (26%) cases were caused by asphyxia including 15 cases died by hanging and 7 cases died by drowning in water [11] whereas Yaycı et al. have reported that death cases because of asphyxia were 13.0%, 47.3% of the cases were accidental and drowning in water (44.3%) was between 15-18 years of age [12].

We believe that this difference in national data is dependent to regional geographical characteristics (sea, river), mother's education level and difference in access to healthcare services.

We also believe that to prevent aspiration-induced death cases, the child should not be laid down immediately after feeding and foods that are difficult to tolerate should not be given within the first one year of life. During further years of life, it is obvious that the children tend to take the objects that they hold to their mouths because of curiosity and they should be closely supervised and cared due to risk of gastrointestinal and respiratory system obstructions [26] by such objects.

Since most of the childhood drowning cases was accidental, parents, babysitters should take preventive precautions, simple barriers should be put around the pools, security vests should be kept, people who do not know to swim should be supervised in the rivers and seas, drug, narcotic and alcohol intake should be avoided, first aid education should be taken etc. [11]; and we believe that such precautions would reduce childhood death cases due to drowning.

Deaths due to poisoning form 6% of all death cases in our study. Among posioning cases; carbon monoxide (CO) poisoning is the first by 47.6%. The cause for death cases because of CO poisoning were the most common in a similar study conducted in Turkey may due to use of coal burning stove to get warm during winter season [12] and unconscious stove using in Turkey.

Since the study territory has a hot, continental climate, 4 (0.3%) death cases due to scorpion stinging were detected. Even rare, child death due to scorpion stinging was reported in the literature [30].

Among all death cases, natural death occurred in 59 (5.3%) cases and cause for death was detected as a result of medical diseases including bronchopenumonia, bronchitis, central nervous system infection, cardiovascular disease (cardiac septum defects), rubeola. Cordelia et al. have reported that 27 of 42 cases who have been reported as natural death between 0-1 age range died as a result of similar medical diseases [11]

Death cases occurred as a result of home accidents because of easy access to flammable materials by the children, failure to supervise hot water and hot oil, keeping hot milk in an open environment in rural areas [11] are important. In our study, death rate due to burn was detected as 50 (4.4%). It was detected that all death cases occurred accidentally and 70.1% of such cases appeared in 1-4 age group. Yaycı et al. have reported death cases due to burn as 51.1% in 1-4 years age group [12].

It was detected in our study that 40 (3.5%) cases have died as a result of squeezing the head between two objects, having TV fallen on, dragging-goring by an animal, being trapped in the wreckage. We believe that children who live in suburbs have a high risk for exposure to accidents at home and children living in rural regions are exposed to animal attacks in streets and villages under uncontrolled environments.

Unexplained sudden infant deaths were detected higher in the group below 1 year of age than other age groups. It was reported that sudden infant death syndrome was decided in 26 (2.3%) cases according to the histopathological examinations, crime scene investigations and parent statements; this rate was mentioned as 15% [11] in a similar study. We believe that there are problems to detect sudden infant death cases as a result of lack of a standard autopsy protocol in Turkey and deficient crime scene investigation.

It was detected in our study that 28 (58.3%) of 48 children were between 15 and 18 years. Cordelia et al. have reported 7 (5.0%) homicide victims among 140 children [11] whereas Sarah et al. have reported 327 (8.8%) homicide victims among 3820 children. Although age ranges are different, homicides were reported most in 15-18 age group [13].

Suicide is more in males than females and it was detected that 46 (4.1%) cases who have died as a result of suicide included 27 (58.6%) cases in 15-18 years old age group, 14 (30.4%) cases in 10-14 years old age group; and 25 cases (54.3) have used hanging method whereas 12 (26.1%) cases have used firearms.

Cordelia et al. have reported hat among 140 cases, 19 (13.6%) died as a result of suicide, among such 19 cases, 14 (73.6%) have used hanging method, 13 (68.4%) cases were between 15 and 18 years old, 6 (31.6%) cases were between 10 and 14 years old and male gender was more [11]. Sarah et al. have specified in their study conducted on 3820 cases that 337 (8.8%) cases have died because of suicide, age average was 17.2, 141 (41.8%) have used hanging method [13]. We consider that the cause for preferring hanging method is being simple and easy to obtain, the cause for detection in teens at 15 years and over is failure to deal with challenges in adoption to social life during adolescent period, to be exposed to parent pressure against their will to be free and social causes like problematic relationships.

Since our study was carried out on the cases in 2012 and before, 46 cases who were injured and died in the civil war in Syria for last 6 month period in 2012 were included only. We believe death child deaths increased during further years. In parallel with injury sites, the most common cause of death as brain damage and bleeding and visceral organ damages was found consistent with similar studies [31,32].

Partial problems are experienced in order to detect cause of death and origin due to insufficient forensic medicine specialist and lack of implementation of a Standard autopsy protocol in the autopsies performed in Turkey general. We believe that these problems may be resolved by providing a standardization like in developed countries.

Consequently, it was observed that child death cases occurred in our territory were frequently accidental and traffic accidents were more common. Results complied with the literature. It is reported that there are many different reasons for deaths during the childhood and this difference may depend on country, location, age groups [33]. However, it is a fact that preventions to reduce child

deaths are not different. Simple preventive precautions such as parent training in particular [34], babysitter supervision, obeying traffic rules, keeping chemical, agricultural pesticides and medical drugs in safe environments will reduce deaths due to accidents. Parent support as well as psychological consultancy will reduce deaths because of suicide during adolescent period.

Disclosure statement

This research was presented as a poster at the xıx.ınternational congress on child abuse and neglect (ıspcan) 09-12.09.2012.

References

1. Children's bill of rights. Available at: http://ncpcr.gov.in/Acts/Childrens_Bill of Rights Adopted by NCERT.pdf. Retrieved February. 2014;26.
2. Towner E, Towner J. UNICEF's child injury league table. An analysis of legislation:more mixed messages. Injury Prevention. 2002;8(2):97-100.
3. World Health Organization. International Classification of Diseases and Related Health Problems, Tenth Revision (ICD-X), Geneva, 1993.
4. Byard RW. Accidental childhood death and the role of the pathologist. Pediatric and Developmental Pathology. 2000;3(5):405-18.
5. Byard RW, Cohle SD. Chapter 2 nd Sudden death in ınfancy, childhood and adolescence, Cambridge University Press. 2004;11-76.
6. Uğur Baysal S. Child safety: injuries and poisonings control. children's health and diseases. Book (Cantez T, Eker Ömeroğlu R, Uğur Baysal S, Oğuz F, Editors). Istanbul: Nobel Book Stores. 2003:58-72.
7. Peclet MH, Newman KD, Eichelberger MR, Gotschall CS, Guzzetta PC, Anderson KD, Garcia VF, Randolph JG, Bowman LM. Patterns of injury in children. J Pediatr Surg. 1990;25(1):85-91.
8. Convention on children's rights. Accessed on: February 26, 2014, Available at:http://www.unicef.org/turkey/crc/cr23c.html#art2
9. Pakiş I, Karapirli M, Yaycı N. Childhood accidents due to an object falling on the victim. Acıbadem University of Health Sciences Journal. 2010;1(2):81-8.
10. Available at:http://tuikapp.tuik.gov.tr/adnksdagitapp/adnks.zul Accessed on:February 26, 2014.
11. Cordelia N. Okoye MPH, Matthias I. Okoye. Forensic epidemiology of childhood deaths in Nebraska, USA J Forensic Leg Med. 2011;18(8):366-74.
12. N.Yayci, I.Pakis, M. Karapirli, S.Celik, C. Uysal, O. Polat The review of autopsy cases of accidental childhood deaths in İstanbul. J Forensic Leg Med. 2011;1:253-6.
13. SL. Lathrop. Childhood Fatalities in New Mexico: Medical Examiner-Investigated Cases, 2000–2010, J Forensic Sci. 2013;58(3):700-4.
14. CDC. Childhood Injury Report: Patterns of unintentional injuries among 0-19 years old in the United States, 2000-2006. Available at: http://www.cdc.gov/safechild/images/CDC-ChildhoodInjury.pdf. (Retrieved March 19.2014)
15. Kanchan T, Menezes RG. Accidental childhood fatalities in Manipal, India. Trop Doct. 2008;38(3):188-9
16. Grass H, Madea B. Child homicide in Cologne (1985-1994). Forensic Sci Int. 1996;79(2):131-44.
17. Karagoz YM, Atilgan M, Karagöz SD, Akman R. Forensic autopsies children. Forensic Medicine Bulletin. 1999;4(3):120-2.
18. Parkkari J, Kannus P, Niemi S, Koskinen S, Palvanen M, Vuori I, et al. Childhood deaths and injuries in Finland in 1971-1995. Int J Epidemiol. 2000;29:516-23.
19. Salaçin S, Alper B, Cekin N. Fatal childhood accidents that ended in Adana regional characteristics. JFS. 1992;8:125-30.
20. Turkmen N, Fedakar R. Between the years 1996-2001 in Bursa unnatural child deaths autopsied. Anatolian Journal of Medicine. 2002;4(3):142-51.
21. Canturk N, Es¸ iyok B, Ozkara E, Canturk G, Ozata AB, Yavuz MF. Medico-legal child deaths in Istanbul: data from the morgue department. Pediatr Int. 2007;49:88-93.
22. Svien LR, Senne SA, Rasmussen C. South Dakota accidental childhood deaths, 2000-2007: what can we do? South Dakota J Med. 2010;63(5):163-5.
23. Fraga AMA, Fraga GP, Stanley C, Costantini TW, Coimbra R. Children at danger: injury fatalities among children in San Diego county. Eur J Epidemiolgy. 2010;25(3):211-7.
24. Maloney D, Keller SJ, Fierro MF. Child deaths in Virginia, 1996: a review of investigations of sudden, unexpected, or unnatural deaths of children less than age 13. Am J Forensic Med Pathol. 2000;21(2):189-94.
25. Noland VJ, Morissette B, Liller KD. Child death review team findings: implications for health educators. Int Electron J Health Educators. 2000;3(4):291e7 [cited 2011 Dec 10]. Available at: http://www.iejhe.org.
26. Agran PF, Anderson C, Winn D, Trent R, Walton-Haynes L, Thayer S. Rates of pediatric injuries by 3-month intervals for children 0 to 3 years of age. Pediatrics. 2003;111(6 Pt 1):e683-92.
27. Somers GR, Chiasson DA, Smith CR. Pediatric drowing. A 20-year review of autopsied cases: I.demographic features. Am J Forensic Med Pathol. 2005;26(4):316-9.
28. Silva DT, Ruben AR, Wronski I, Stronach P, Woods M. Excessive rates of childhood mortality in the northern territory, 1985-1994. J Pedaitr Child Health. 1998;34:63-8.
29. Witernute GJ. Childhood drowing and near drowing in the United States. Am J Dis Child. 1990;144(6):663-9.
30. Oyedeji OA, Musa TL, Adebami OJ, Oyedeji GA. Fatal scorpion sting in a child. Niger J Clin Pract. 2014;17(1):112-4.
31. Rainio J, Lalu KJ, Penttila A. Independent forensic autopsies in an armed conflict: investigation of the victims from Racak, Kosovo. Forensic Sci Int. 2001;116(2-3);171-85.
32. Eastridge BJ, Hardin M, Cantrell J, Oetjen-Gerdes L, Zubko T, Mallak C, Wade CE, Simmons J, Mace J, Mabry R, Bolenbaucher R, Blackbourne LH. Died of wounds on the battlefield: causation and implications for improving combat casualty care. J Trauma. 2011:71(1 Suppl):s4-8.
33. Yüksel F, Türkkan D, Ünal BM, Dinç AH. Autopsy findings in preschool childhood mortality. Balkan Med J. 2010;27(1):65-7.
34. Aydın B, Karaarslan B. In Samsun childhood forensic investigation of death cases (1998-2003). JFS. 2005;4(2):25-32.