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Medicolegal Evaluation of Infanticide Pattern in Assiut Governorate, Egypt from 2008 to 2013 (a Retrospective Study)

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Abstract Infanticide is a crime that has been practiced in all societies since the down of humanity. This retrospective study was conducted to assess the magnitude and evaluate the pattern of infanticide in Assiut Governorate from 2008 to 2013 as well as to study the reasons and suggest the solutions for this crime. The pattern was assessed through examination of the medicolegal reports of infanticide cases which referred to the Assiut Medicolegal Department of Ministry of Justice during this period. Infanticide cases were evaluated as regards the number, annual, seasonal and geographical distribution, ways of notification of the crime, places of concealments of the infants, infant's wrapping, recognition of the victims and accused identities, as well as the gender, condition of umbilical cord, stage of maturity, causes and time passed since death. Thirty five new born infants were found. The biggest number of cases was found in the years 2011 (8 cases) and 2012 (8 cases). The highest percentage of cases occurred in winter and summer months which represented 42.85% and 31.43% of total case respectively. The highest percentage of cases was found in Abnoub and El Fateh center then Manfalout center which represented 28.57% and 22.86% of total cases respectively. The common places of concealment of the infants were rubbish heaps (31.43%), canals water (22.86%), around and inside buildings (20%) and upon a bridges (14.29%). Infants with wrappings were found in 54.29% while infants without wrappings were found in 45.71% of total cases. Identity of infants and suspects of the crime was recognized in 8.57% of the total cases. The percentage of females (60%) was more than males (40%). Non medical ligation of the umbilical cord was found in 65.72% of total. Full term mature infants represented 88.57% while preterm infants represented 11.43% of total cases. The commonest causes of death were head injuries (48.57%) followed by omission (of feeding, coverings and umbilical cord ligation) occurred in 28.57% % of total cases while unidentified cause of death represented 23.81% of total cases due to advanced putrefaction. Time passed since death was determined in 65.71% while it was not determined (corpses kept in refrigerators) in 34.29% of total cases. This study suggest to solve this problem to put a specific legislations of infanticide, write a standard medicolegal report about cases, increase public awareness to search and notify about infanticide cases, improve economic and educational states especially of females, active the security and religious roles to prevent illegal sexual relationships, give attention to social care institutions for infants of unknown parentage and treat mothers which have psychiatric disorders.

Keywords Medicolegal, Pattern, Infanticide, Assiut Governorate, Egypt

Introduction

Infanticide is killing of infants within the first year of life (Camperio Ciani and Fontanesi, 2012). Neonaticide is the killing of infants within the first 24 hours of life (Gheorghe et al., 2011). Filicide is parents killing of their own children (Putkonen et al., 2011).

Both neonaticide and infanticide have been practiced in most communities since the earliest recorded times. The assessment of such cases is often difficult as the bodies of the victims are usually hidden and injuries may not be found at autopsy (Byard, 2005).

In most cases of neonaticide the mother is the guilty party and the pregnancy has been concealed. The common methods of killing are strangulation, drowning, and hypothermia and/ neglect. The roles of the pathologist include determining if the victim was born alive, ascertaining the cause of death, and

assisting in identifying the mother (Langlois et al., 2013).

Before Islam, female infanticide was widely practiced in the Arabian Peninsula. With the dawn of Islam, the practice was clearly prohibited by the Quran (Al-Mahroos et al., 2005).

Historically, societies have varied in the sanctions applied to perpetrators of such acts, across both time and place. In modern times many nations now have infanticide acts that reduce the penalties for mothers who kill their infants. The criteria relate women that are suffering the hormonal or mood effects of pregnancy/lactation, the time of the offence is restricted to the first year after delivery (Friedman et al., 2012).

Females who kill their newly born infants most often are poor, relatively young, unmarried, lack prenatal care (Friedman and Resnick, 2009), illiterate or have low educational level and unemployed (Stone et al., 2005). Motives of infanticide include denial of pregnancy (Jenkins et al., 2011), illegitimate birth, infants born with congenital deformities, large family size, poverty, domestic violence (de Hilari et al., 2009), postpartum psychosis (Nau et al., 2012) and daughter aversion in some communities as in rural India (Diamond-Smith et al., 2008).

In practice, all cases of abandoned newborn deaths are reported to the police/coroner, who asks for a post-mortem examination because only this can establish the viability of the infant, proof of separate existence, and the cause and manner of death in such cases. The pathologist who conducts the autopsy will have to use his skills and experience to assess a wide variety of marks and injuries so as to give his opinion fairly and frankly, not allowing any personal feelings to influence his findings. In some cases, he may be unable to give a firm opinion and should not shirk from stating this clearly (Sharma, 2006).

Infanticide was reported in studies in different parts of the world as United States (Malmquist, 2013), France (Vellut et al., 2012), Italian (Camperio Ciani et al., 2012), India (Diamond-Smith et al., 2008), Chile (Benítez-Borrego et al., 2013).

Assiut is one of Upper Egypt Governorates. The population census of Egypt which carried out annually showed that the population estimate in Assiut governorate reached 4,011,564 on the first of January 2013 as mentioned by the Central Agency for Public Mobilization and Statistics of Egypt (CAPMAS, 2013).

Although a lot of articles about infanticide have been published abroad, there are scarce studies about its magnitude and pattern in the Egyptian Governorates.

Aim of work

This study aims to: **First**, to assess the magnitude of infanticide in Assiut Governorate from 2008 to 2013. **Second**, to evaluate the pattern of infanticide in that governorate and to compare this pattern with that already recorded in other Egyptian Governorates and other countries. **Third**, to study reasons underlying such social problem and suggest the solutions for that problem.

Subjects and Methods

Subjects

Thirty five infants were reported to be killed during the first year of their life through the period from 2008 to 2013. The data was collected from Assiut medicolegal department of Ministry of Justice.

Inclusion criteria

Live born infants which known by hydrostatic test and the death was determined to be homicidal (Große-Ostendorf et al., 2013).

Exclusion criteria

1. Stillbirths
2. Dead infants due to other causes than the crime of infanticide e.g.
    a. Negligence claims
    b. Congenital anomalies
    c. Labor problems as obstructed or precipitate labor
    d. Maternal death or diseases

Methods

(I) Data collection

The data was collected from the archives of the Medicolegal Department, Ministry of Justice in Assiut Governorate during the period from 1st January 2008 to 31th December 2013. The pattern was evaluated as follows: (1) number (2) distribution (annual, seasonal and geographical) (3) way of notification to the legal authorities (4) places of concealment (5) wrappings (6) Identity and gender of the victim and the accused (7) stage of maturity of the infant (full term or preterm) (8) condition of the umbilical cord (9) postmortem changes (10) cause of death (11) time passed since death. Details as notification to legal authorities, recognition of identity of infants and the accused, places of concealment of the infants and identification of wrappings was determined using information from the medicolegal report include parquet information, case histories, scene circumstances, external and internal examination of infants.

Ethical Consideration

This work was done after approval from the ethical committee of Faculty of Medicine, Assiut University. Agreement for perusal of records was obtained from head office of Assiut Medicolegal Department of Ministry of Justice. Confidentiality of the medicolegal reports was maintained by keeping the reports anonymous.

(II) Statistical Analysis

The collected data then organized, tabulated, entered into a computer database program using SPSS (Statistical Package for Social Sciences) software version 20. Descriptive analysis and Chi-square test (X^2) used for comparison of the data (Altman, 1991 and Collett, 1994). When p. value ≤=0.01 is highly significant, ≤=0.05 is significant and >0.05 is not significant.

Results

Table (1): Shows the biggest number of totally examined cases by the Assiut medicolegal department was 4046 and 3195 in the years 2013 and 2012 respectively. The biggest number of total autopsy (527) was reported in the year 2012. The percentage of infanticide cases was 1.69 % and 0.23% of the total autopsy and totally examined cases respectively. Although there is no statistical significant difference between the different years, the biggest number of infanticide cases was reported in the years 2011 and 2012.

Column chart (1): Shows the biggest number of annual distribution of infanticide cases was found in years 2011 (8 cases) and 2012 (8 cases).

Table (2) and column chart (2): Show a highly significant statistical increase in percentage of infanticide cases in winter season (42.85% (P value ≤ 0.01), followed by summer season (31.43%) of total cases.

Table (3) and column chart (3): Show the highest percentage of victims was found in Abnoub and El Fateh center followed by Manfalout center then first Assiut city district which represented 28.57%, 22.86% and 20% of total cases respectively.

Table (4): Shows the highest percentage of notification way legal authorities was found by known person which represented 65.71% of total cases while notification by phone calls from unknown persons represented 20% of total, by moving police cars represented 14.29% of total cases.

Table (5) and column chart (4): Show the highest percentage of concealed infants was found in rubbish heaps in the streets 31.43% (11 cases). Eight cases were recovered from canals (22.86%). Seven cases were found inside and outside different buildings (20%) distributed as the following (3 cases found inside and around apartment buildings, 1 case was found inside desert building, 1 case in front of school, 1 case in front of coffee shop, 1 case in front of healthcare center). Five cases were found upon bridges (14.29%). Two cases were found inside hospital's toilets (5.71%). Two cases were found at side roads (5.71%). The difference is statistically significant (p value ≤ 0.05).

Table (6) and pie chart (1): Show the wrappings were found in 54.29 % of total cases (in the form of dresses 42.86%, clothes roll 8.75% and blanket 2.86 %) while absence of wrappings was found in 45.71% of total cases. The difference between presence and absence of wrappings was statistically non significant (p value >0.05).

Table (7) and pie chart (2): Show identities of infants and accused were known only in 14.29% of total cases.

Table (8) and pie chart (3): Show non significant difference between number of male and female infants (p value >0.05) although the percentage of females (60%) was more than that of males (40%).

Table (9) and pie chart (4): Show the highest percentage of infants were full term which represented 88.57 % while premature infants represented 11.43% of total cases. The difference is a highly statistically significant (P value ≤ 0.01).

Table (10): Shows the highest percentage of cases showed non medical ligation of cord which represented 65.72% of total while medical ligation of the cord was found in 28.57% of total and separation of the umbilical stump was found in 5.71% of total cases. The difference is a highly statistically significant (P value ≤ 0.01).

Table (11): Shows the presence of putrefaction, hypostasis and rigor mortis hypostasis in 23.81%, 76.19% and 31.43% of total cases respectively. Neither adipocere nor mummification was detected. There was a highly statistically significant difference between percent of presence and absence of these postmortem changes (P value ≤0.01).

Table (12) and column chart (5): Show the percentage of determined causes of death (85.71%) was more than the percentage of undetermined causes of death (14.29%). The difference was a highly statistically significant (P value ≤0.01). In the determined causes, head injuries constituted the highest percentage (48.57%) followed by omission which represented 28.57% of total. They showed a highly statistically significant difference than other causes of death (P value ≤0.01), where drowning represented 5.71% and smothering represented 2.86% of total cases.

Table (13) and column chart (6): Show the determined time passed since death found in 65.71% of total cases distributed as: 17.14 % within 1 day, 17.14% within 1-2 days, 8.57% since 3 days, 11.43 since 3-7 days, 2.86% since 7 days and 8.57% since 7-14 days. Undetermined time passed since death occurred in 34.29% of total cases (the corpses kept in the hospital refrigerators). The statistical difference between determined and non determined postmortem interval is highly significant (P value ≤0.01).

Table (1): Chi-square statistical analysis of infanticide, total autopsy and totally examined cases by the medicolegal department in Assiut Governorate from 2008 to 2013

Parameter	Years												Total		P value
	2008		2009		2010		2011		2012		2013				
	No.	%	No.	%	No.	%	No.	%	N.	%	No.	%	No.	%	
Totally examined cases	1823	11.7	1977	12.7	1962	12.6	2515	16.2	3195	20.6	4046	26.1	15518	100	
Total autopsy	207	10.0	195	9.4	235	11.3	436	21.0	527	25.4	477	23.0	2077	100	0.001**
Infanticide	7	20	4	11.43	4	11.43	8	22.86	8	22.86	4	11.43	35	100	0.505^{Ns}
Chi-square	148.3		168.1		209.4		398.7		485.6		429.7		1914.3		
P. value	0.001**		0.001**		0.001**		0.001**		0.001**		0.001**		0.001**		
Percent of infanticide to all cases	0.38%		0.20%		0.21%		0.32%		0.25%		0.1%		0.23%		0.378 ^{Ns}
Percent of infanticide to autopsy	3.38%		2.05%		1.7%		1.83%		1.52%		0.84%		1.69%		0.427^{Ns}

*P. value ** ≤0.01 highly significant, * ≤0.05 significant, >0.05 not significant (Ns)*

Table (2): Chi-square statistical analysis of seasonal distribution of infanticide cases in Assiut Governorate from 2008 to 2013

Seasons	No.	Percent	P value
Winter	15	42.85	0.001**
Autumn	4	11.43	
Summer	11	31.43	0.105
Spring	5	14.29	
Total	42	100.0	
Chi-square	12.3		
P. value	0.006**		

*P. value ** ≤0.01 highly significant, *≤0.05 significant, >0.05 not significant (Ns)*

Table (3): Chi-square statistical analysis of geographical distribution of victims of infanticide in Assiut Governorate from 2008 to 2013

Regions	No.	Percent
First Assiut city district	7	20
Second Assiut city district	2	5.71
Assiut Rural Region	1	2.86
Manfalout	8	22.86
Al Kosia	1	2.86
Dayrout	1	2.86
Sedva	2	5.71
EL Ganiam	1	2.86
Sahel Saleem	2	5.71
Abnoub and El Fateh	10	28.57
Total cases	35	
Chi-square	33.81	
P. value	0.001**	

*P. value ** ≤0.01 highly significant, *≤0.05 significant, >0.05 not significant (Ns)*

Table (4): Chi-square statistical analysis of ways of notification to the legal authorities about infanticide cases in Assiut Governorate from 2008 to 2013

Sources of notification	No.	Percent
Known person	23	65.71
Phone calls from unknown person	7	20
Moving police cars	5	14.29
Total	35	100.0
Chi-square	25.1	
P. value	0.001**	

*P. value ** ≤0.01 highly significant, * ≤ 0.05 significant, >0.05 not significant (Ns)*

Table (5): Chi-square statistical analysis of places of concealment of infanticide cases in Assiut Governorate from 2008 to 2013

Place of concealment	No.	Percent
Rubbish heaps in streets	11	31.43
Inside and around buildings	7	20
Side roads	2	5.71
Inside hospitals toilet	2	5.71
Canals water	8	22.86
Upon a bridges	5	14.29
Total	35	100
Chi-square	12.93	
P. value	0.024*	

*P. value ** ≤0.01 highly significant, * ≤ 0.05 significant, >0.05 not significant (Ns)*

Table (6): Chi-square statistical analysis of wrappings of examined infanticide cases in Assiut Governorate from 2008 to 2013

Coverings	No.	Percent
Wrappings	(total=19)	(54.29)
a- Wear dress	15	42.86
b- Clothes roll	3	8.57
c- Blanket	1	2.86
No wrappings (bare bodies)	(total=16)	(45.71)
Total	35	100
Chi-square	0.52	
P. value	0.472^{Ns}	

*P. value ** ≤0.01 highly significant, * ≤ 0.05 significant, >0.05 not significant (Ns)*

Table (7): Chi-square statistical analysis of personal identification of infants and the accused of the infanticides in Assiut Governorate from 2008 to 2013

Identity	No.	Percent
Known	3	8.57
Unknown	32	91.43
Total	35	100
Chi-square	48.06	
P. value	0.001**	

*P. value ** ≤0.01 highly significant, * ≤ 0.05 significant, >0.05 not significant (Ns)*

Table (8): Chi-square statistical analysis of gender distribution of victims of infanticide in Assiut Governorate from 2008 to 2013

Gender	No.	Percent
Male	14	40%
Females	21	60%
Total	35	
Chi-square	2.80	
P value	0.094^{Ns}	

*P. value ** ≤0.01 highly significant, * ≤ 0.05 significant, >0.05 not significant (Ns)*

Table (9): Chi-square statistical analysis of full term and premature infants in examined infanticide cases in Assiut Governorate from 2008 to 2013

Maturity	No.	Percent
Full term	31	88.57
Preterm	4	11.43
Total	35	100
Chi-square	48.77	
P. value	0.001**	

*P. value ** ≤0.01 highly significant, * ≤ 0.05 significant, >0.05 not significant (Ns)*

Table (10): Chi-square statistical analysis of the umbilical cord conditions of the examined infanticide cases in Assiut Governorate from 2008 to 2013

Umbilical cord	No.	Percent
Medical ligation	10	28.57
Non medical ligation	23	65.72
Separation of umbilical stump	2	5.71
Total	35	100
Chi-square	28.9	
P. value	0.001**	

*P. value ** ≤0.01 highly significant, * ≤ 0.05 significant, >0.05 not significant (Ns)*

Table (11): Chi-square statistical analysis of postmortem changes among the infants in infanticide cases in Assiut Governorate from 2008 to 2013

Post mortem changes	No.	Percent	**Chi-square** (presence & absence)	P. value
Putrefaction	12	23.81	19.21	0.001**
Hypostasis	23	76.19	19.21	0.001**
Rigor mortis	11	31.43	9.66	0.002**
Adipocere	0.0	0.0	-	-
Mummification	0.0	0.0	-	-

*P. value ** ≤0.01 highly significant, * ≤ 0.05 significant, >0.05 not significant (Ns)*

Table (12): Chi-square statistical analysis of causes of infants death in examined infanticide cases in Assiut Governorate from 2008 to 2013

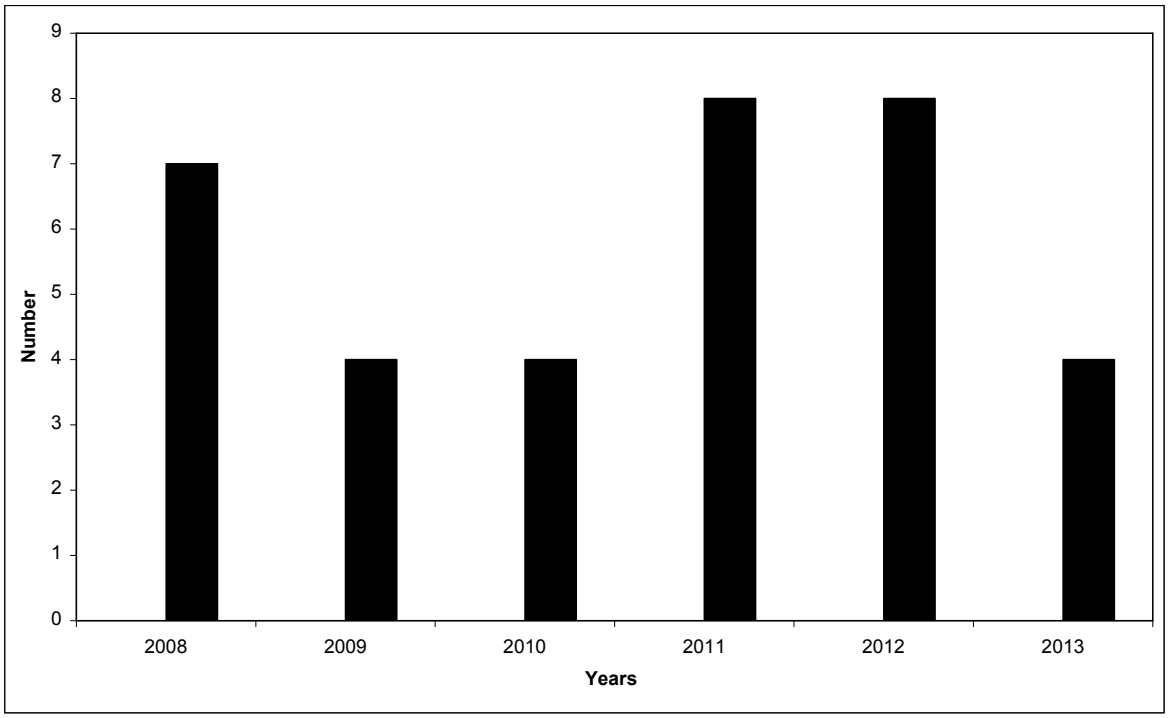
Causes of death	No.	Percent
Omission	10	28.57
Head injuries	17	48.57
Drowning	2	5.71
Smothering	1	2.86
Undetermined	5	14.29
Total	35	
Chi-square	31.07	
P. value	0.001**	

*P. value ** ≤0.01 highly significant, * ≤ 0.05 significant, >0.05 not significant (Ns)*

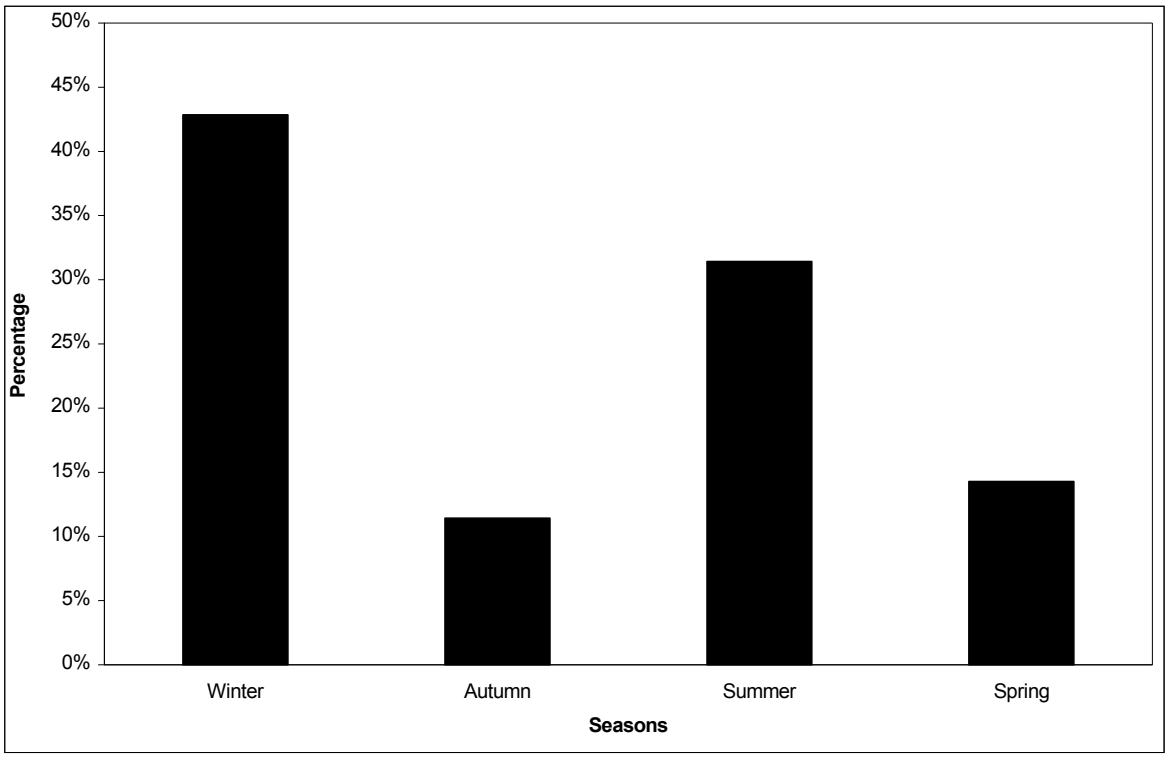
Table (13): Chi-square statistical analysis of time passed since death of infants in examined infanticide cases in Assiut from 2008 to 2013

Time passed since death	No.	Percent	Chi-square	p. value
(A) Determined				
-Less than one day	6	17.14		
- 1-2 days	6	17.14		
-3 days	3	8.57	5.51	0.356
-3-7 days	4	11.43		
-7 days	1	2.86		
7-14 days	3	8.57		
Total Determined	23	65.71	6.91	0.008**
(B) Not determined (corpses kept in refrigerators)	12	34.29		

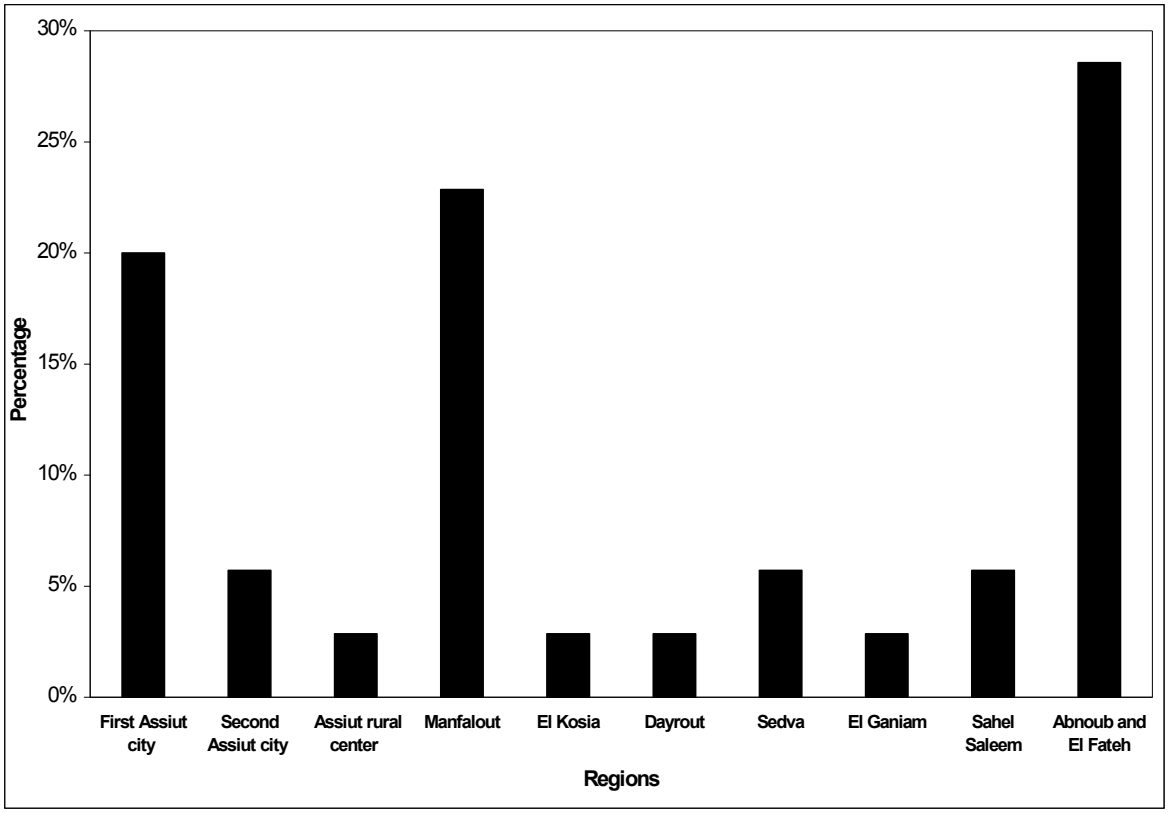
*P. value ** ≤0.01 highly significant, * ≤ 0.05 significant, >0.05 not significant (Ns)*



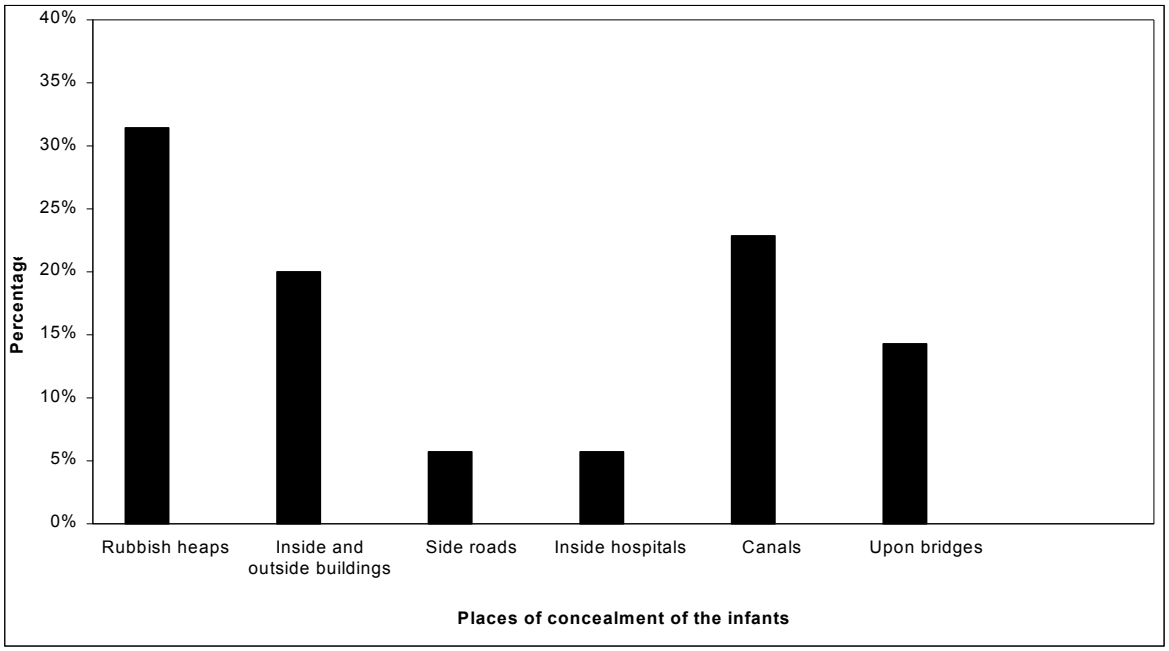
Column Chart (1): The annual distribution of infanticide cases in Assiut Governorate from 2008 to 2013.



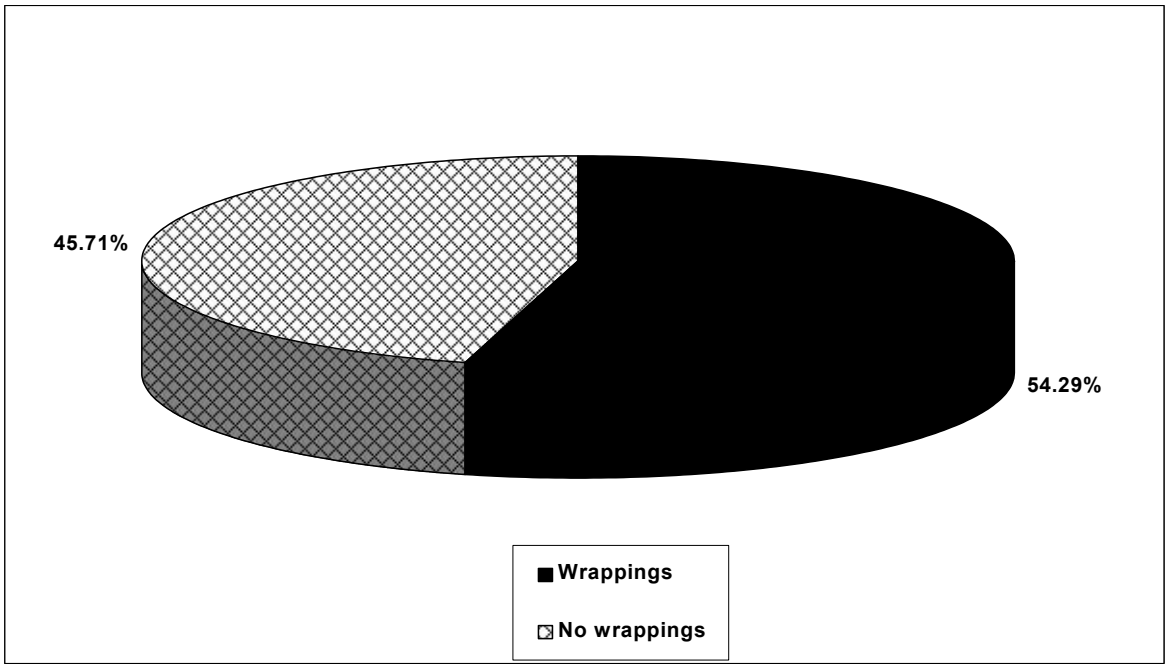
Column Chart (2): The percentage of seasonal distribution of infanticide cases in Assiut Governorate from 2008 to 2013.



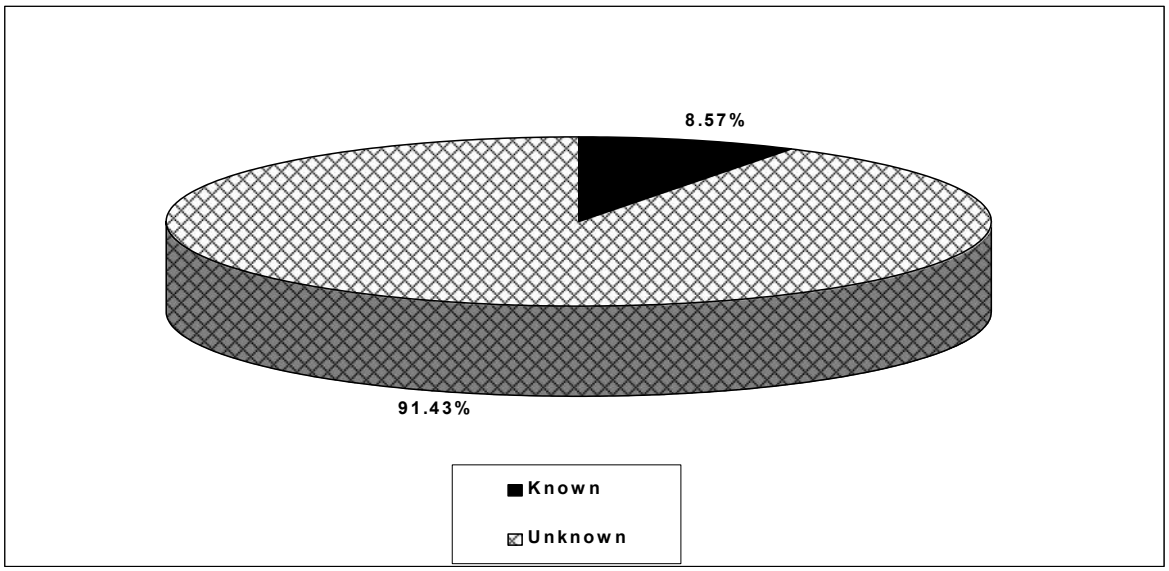
Column Chart (3): The percentage of geographical distribution of victims of infanticide in Assiut Governorate from 2008 to 2013.



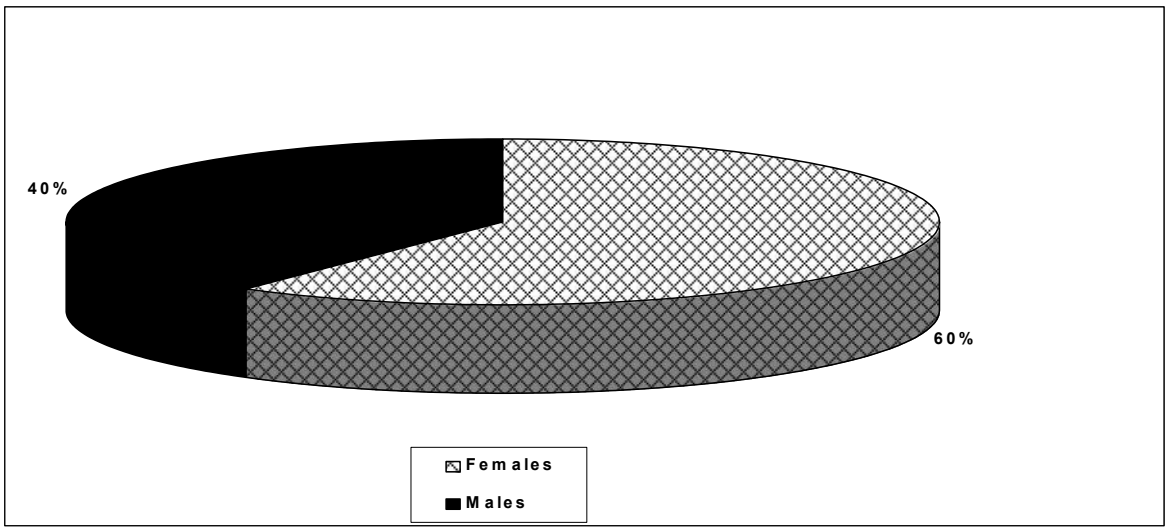
Column Chart (4): The percentage of places of concealment of infanticide cases in Assiut Governorate from 2008 to 2013.



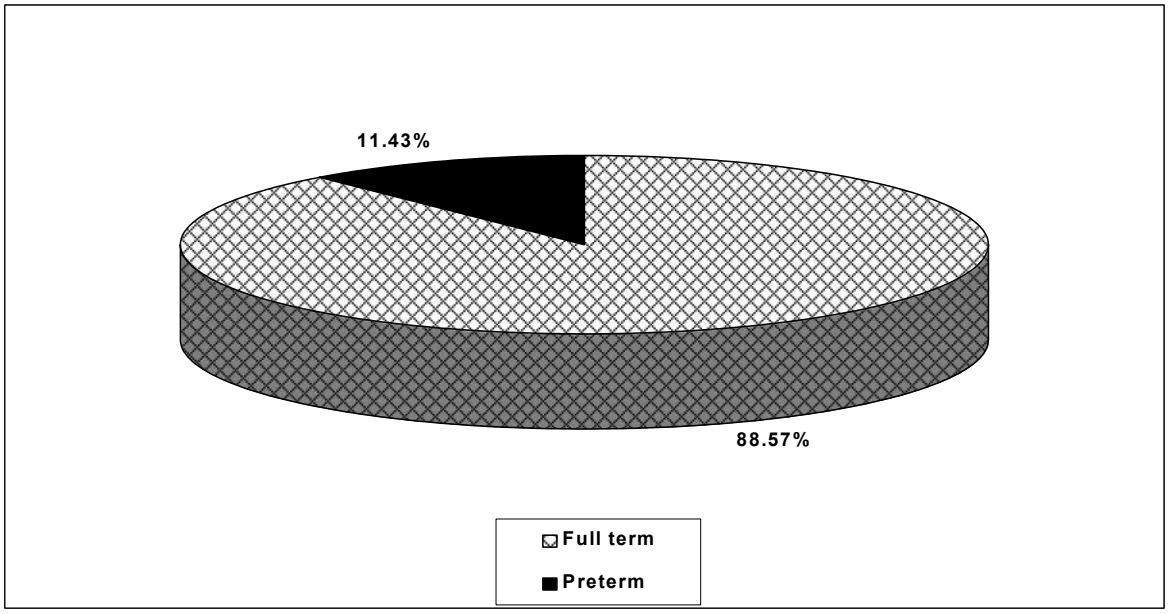
Pie Chart (1): The percentage of wrapping and unwrapping in the examined infanticide cases in Assiut Governorate from 2008 to 2013.



Pie Chart (2): The percentage of personal identification of infants and the suspects of the infanticides in Assiut Governorate from 2008 to 2013.

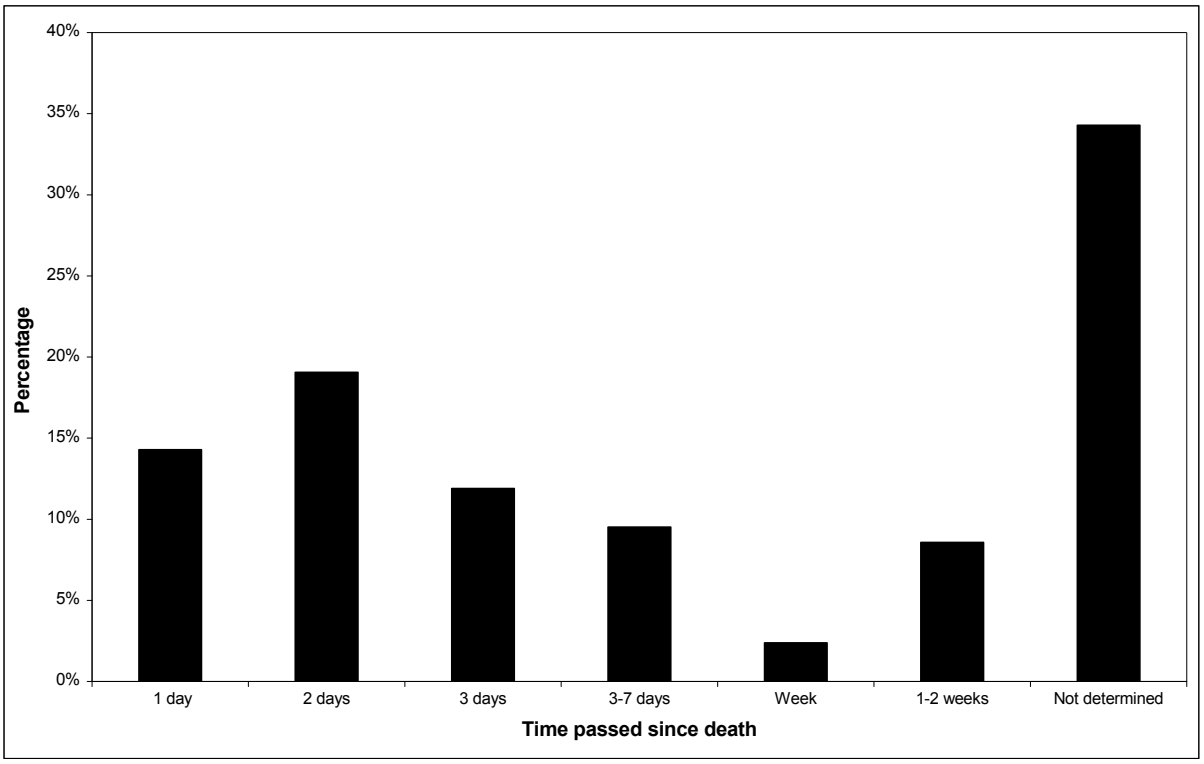


Pie Chart (3): The percentage of gender distribution of infants of examined infanticide cases in Assiut from 2008 to 2013.



Pie Chart (4): The percentage of full term and preterm infants in examined infanticide cases in Assiut Governorate from 2008 to 2013.

Column Chart (5): The percentage of causes of infants death in examined infanticide cases in Assiut Governorate from 2008 to 2013.



Column Chart (6): The percentage of time passed since death of infants of examined infanticide cases in Assiut Governorate from 2008 to 2013.

Discussion

Neonaticide is a sad and infrequent crime with possibly a high level of underreporting (Putkonen et al., 2007).

It is very difficult to get accurate figures on the incidence of neonaticide and infant homicide since many cases are never discovered; official figures are likely to be an underestimate (Marks, 1996).

In most cases the crime of infanticide is generally committed at the time of, or within a few hours after, the birth of the infant. There is no definite item in the British law regarding the period up to which an infant may be considered "newly-born". The Judges in England have usually held that an infant is newly-born up to fifteen days after its birth (Modi, 2013).

In the Egyptian penal code infanticide is killing of a new born live child, is regarded as ordinary murder as killing of other persons. In the Egyptian law there is no special item for infanticide. Legally infant is considered live born if he is showing evidence of life as crying, sneezing or moving a limb by witness. Medicolegally, this is evidenced by respiration (Soliman, 1966). Also there is no special item for infanticide in different Egyptian constitutions.

In many countries there is no specific legislation for infanticide and consider the crime as a child murder. Others as United Kingdom has the English Infanticide Act 1938 (Section 1) stated that where women by any willful act of omission or commission cause death of a child under the age of 12 months while her mind is disturbed by having giving birth or effect of lactation for the reason of hormonal changes is considered as manslaughter (Saukko and Knight, 2004).

In the United States, the infanticide acts do not have a separate legal item and are considered as a homicide murder of first to third degrees. Trials for infanticide regulations in cases of psychiatric mother related to assessment of sanity and in presence of sufficient proofs for psychological disease, perpetrators sent to psychiatric treatment (MacFarlane, 2003).

Legally in India, the infanticide amounts to homicide and all legal provisions applicable to the offence of homicide are applicable to infanticide in Section 318IPC: concealment of birth by secret disposal of the dead body which is an alternative to infanticide amounts to culpable homicide (Vij, 2008).

The function of forensic pathologist in infanticide is identification of the infant and mother, determination whether the infant was born a live or still birth, as well as determination of maturity, the cause of death and time passed since death (Sukko and knight, 2004).

In this study infanticide were 35 cases which represented 1.69 % of total autopsy and 0.23% of total cases examined by Assiut Medicolegal Department of Ministry of Justice from 2008 to 2013.

The annual distribution of cases showed that the biggest number occurred in the years 2011 and 2012 which may attributed to absence of security role and economic difficulties after the Egyptian revolution in 25th of January 2011.

The infanticide number is approximately near to the number recorded in a retrospective study in the Suez Canal area from the database of the Forensic Institution of Port-Said, Egypt but with variable gender

percentage. The infant deaths less than one month were 37 cases. Males were 25 cases which represented 44.7% of total cases and females were 12 cases which represented 36.4% of total cases (El-Elemi and Moustafa, 2013).

A review of death charts which conducted in Zeinhom morgue, Cairo. Children less than one year were 27 cases which divided into 16 males and 11 females (Alsaif et al., 2013).

The infanticide number is low when compared to other countries. A study of homicidal autopsy, in Dakar, Senegal, mentioned that the infanticide cases represented 6.5% of total autopsy (Soumah et al., 2012).

In this study most of cases occurred in winter and summer months which represented 42.85% and 31.43% of total cases respectively. Omission may cause death of newly born infants by starvation, hypothermia or hyperthermia. This was in agreement with the study of McCleary and Chew (2002) who reported that winter the common month for the infanticide crime.

The finding of the present work was supported by the study of Vougiouklakis and Tsiligianni (2006) in Greece who mentioned that winter and summer were the common seasons of infanticide and other homicidal injuries.

In this work, the highest percentage of victims of infanticide was found in Abnoub and El Fateh center, followed by Manfalout center then first Assiut city district which represented 28.57%, 22.86% and 20% of total cases respectively. This may attributed to the population density and low economic state of people in these squares of Assiut. In addition presence of random areas in first Assiut city district with certain social characteristics (poverty, unemployment and domestic violence) which may favor illegal sexual relations.

A study carried out in the Andes, Bolivia demonstrated that the community members maintain beliefs that justify infanticide under certain circumstances either biological (deformities and twin-ship) or social (illegitimate birth, large family size and poverty) (de Hilari et al., 2009).

Illegal sexual relation out of wedlock is socially unacceptable for the females and can create serious public health problems such as illegal abortions, suicide, concealment of pregnancy and infanticide (Jordal et al., 2013). The adverse effects of unwanted pregnancy as feticide, infanticide, or child abuse and neglect, can be prevented by defending the basic human right of the fetus and infant to life, promoting social institutions for child welfare as extended family, foster care and open adoption (Kasule, 2003).

In the present work, the highest percentage of notification to legal authorities was found by known person who represented 65.71% while notification by phone calls from unknown person represented 20% and by moving police cars represented 14.29% of total cases. This necessitates increase the public awareness to notify legal authorities about cases of infanticide.

The concealment of the infant's body usually prevent the detection of the crime of infanticide (Chanana and Bala, 2011).

In this study the common places of concealment of newly born infants was rubbish heaps in the streets (31.43%) followed by canals water (22.86%) then inside and outside buildings (20%). Putting the infants inside plastic bags to hide them was found in 34.29% of total cases.

This was in agreement with the results of a retrospective study of neonaticide and infanticide in Eastern Croatia which reported that the perpetrators preferred rubbish-heaps (33.4%) and various premises in or around the house (16.7%) as places for hiding the killed infants (Marcikić et al., 2006).

In harmony with the present work the study of Ong and Green, (2003) in Malaysia who reported that the body of a newborn is very often disposed of in drains, rivers, or rubbish dumps.

In the present work, 19 infants found with wrappings which represented 54.29% of total cases (15 infants wear dress, 3 Infants were covered in cloth roll represented, in infant wrapped with blanket). It was found 16 infants without wrappings which represented 45.71% of total cases. The nature of wrapping pointed to low socio-economic class of families to whom the killed infants belongs.

The coverings or wrappings or other articles associated with the infants should be examined and retained. It may be torn clothes of the mother or newspapers or plastic bags or rags, etc. Any foreign materials available should be collected and examined. All these items would help in identification of the baby and mother (Vij, 2008).

In this study, the identity of accused persons in the crime was known in 3 cases which represented 8.57% of the total cases (their ages 24, 28, 30 years). The 3 cases were recorded as illegal sexual relations by the parquet information and the mothers were the perpetrators.

This was in agreement with Vallone and Hoffman (2003) which reported that denial of a pregnancy can result in tragic consequences as neonaticide.

In a retrospective study to illustrate the pattern of filicides in Finland during a 25-year period. It was found that 59% of filicides were committed by mothers, 39% by fathers, and 2 % by stepfathers. The number of female and male victims was equal. The filicidal mother often killed their infants for altruistic reasons, in association with suicide and 51% of them had psychosis and depression. Maternal perpetrators dominated in cases of infants death which caused by battering. On the other hand paternal perpetrators, were jealous and violent towards their mates, had a personality disorder (67%) and abused alcohol (45%).

During childhood, most of perpetrators suffered from emotional abuse from their parents or guardians, some of whom engaged in alcohol abuse and domestic violence (Kauppi et al., 2010).

Autopsy was carried out on a study of 150 cases of neonaticide from all over Germany. The autopsy revealed 45% of the cases showed non identified mother. It was found that 27% of corpses were in a state of severe putrefaction which limited the results of forensic examination (Schulte et al., 2013).

A retrospective study of all cases of suspected neonaticide during in Finland. Out of the 50 suspected cases, 32 women were included in the final analyses as neonaticide offenders. Most women (91%) had concealed their pregnancy. The most frequent (63%) method of death was neglect. Four women were diagnosed as psychotics (Putkonen et al., 2007).

A study which was carried out in 26 courts in 3 regions of France over a 5-year period. The result revealed presence of 32 cases of neonaticides; 24 cases perpetrated by 22 mothers, were solved by police investigation. Of them 17 mothers had jobs, 13 were multiparous and 11 lived in a couple relationship. Mothers shared a personality profile marked by immaturity, dependency, weak self esteem, absence of effective support, psychological isolation and poor communication with partners and no pregnancy was registered nor prenatal care followed (Vellut et al., 2012).

In the current study the females represented 60% while males represented 40 % of total cases.

In harmony with the present work, were the results of study of autopsy report of 171 infant by the Board of the Council of Forensic Medicine in Turkey. It was found that 99 cases (57.9%) were female and 70 cases (40.9%) were male. In 2 cases the gender not determined because of advanced purification (Turan et al., 2012).

Infant death is often tragic, particularly in the Arab World, where infants, especially males, are supposed to carry their family's names due to ancient cultural traditions. The medico- legal report for Kuwaiti infants deaths during years 2003-2006 revealed that Kuwaiti infants died due to road traffic accidents and domestic accidents. No Kuwaiti infant died from infanticide (Al-Waheeb and Al-Kandary 2013).

In this study the number of full term fetus (31 cases) was more than that of preterm fetus (4 cases). This was in agreement with the study of Yamauchi et al., (2000) in Japan who reported that presence of 39 cases of infanticide (17 males, and 19 females, 3 unknown). Out of those Japanese cases presence of 30 cases, full term labor, 6 cases as pre-term labor and 3 cases were unknown. The babies were discovered in various places: 13 in family toilets, 4 in other toilets, 5 in a family closet, 7 in other rooms, 1 in a locker and 9 in outdoor areas. The determined causes of death were asphyxia and head injuries (Yamauchi et al., 2000).

The full term fetus of 40 weeks gestation has weight 2550-3660 kg, crown heel length 48-52 cm, head circumference 33-38cm, appearance of ossific centers in lower end of femur, cuboid bone and upper end of tibia, closure of posterior fontanels, laungo hair on the shoulders, vernix caseosa present in flexures of joints and neck folds, the testes are palpable in the scrotum in males; the vulval labia closes the vaginal opening in females, the umbilicus midway between xiphi sternum and pubis, dark mechonium in the large intestine, nails reach beyond finger tips and wrinkled skin (Sukko and Knight 2004).

In this work the non medical ligation of the umbilical cord constituted the highest percentage of newly born infants (65.72%). This was known by presence of domestic ligatures which used in ligation of the cord, as well as unequal and ragged cutting of cord edges were noticed. The new born infants who showed medical ligation of the umbilical cord which denotes medical attendance by medical persons was found in 28.57% of total cases where medical buckles were seen on the cord with clean and regular cut ends of the cord. Falling of umbilical stump with healing and formed umbilicus was present in 5.71% % of total cases which resulted in death by omission. So the highest percentage of cases occurred in low socioeconomic group of population.

The presence of high percentage of non medical ligation of the cord in infanticide cases was reported by Turan et al., (2012) who mentioned that many births especially in rural area of Turkey occur at home without medical assistance. If any infant is found dead in Turkey, the body of infant is sent to the autopsy center by public prosecutor. Most parents who are suspects of infanticide claim that their child died before birth. Some parents also claim about medical malpractice. Determining live birth in these instances may make a difference in subsequent criminal proceedings.

The study of Friedman and Resnick (2009) reported that females kill their newly born infants most often poor, relatively young, unmarried, lacked prenatal care.

In the present study, head injuries were the common cause of death which represented 48.57% of total cases followed by omission which represented 28.57% of total cases. Drowning represented 5.71% and smothering represented 2.86% of total.

Head injuries are a common method of infanticide. The mother may throw the infant to the floor, or dash its head against a wall or other obstruction, sometimes by swinging it by the legs (Sukko and Knight, 2004).

This was also recorded in the study of Rougé-Maillart et al., (2005) who reported that head trauma, strangulation, suffocation, and drowning were the most frequent means of filicide.

Unwanted infants were sometimes drowned or smothered if they were expected to be a financial

burden on the family and the female infants were particularly vulnerable. In some community groups, unwanted infants would be left in the open to die from dehydration, animal attack, or hypo/hyperthermia, starvation. In Europe during the reformation, church leaders advocated the drowning of infants with intellectual impairments (Byard, 2005).

It was reported in study that had been performed in Zenhom Morgue in Cairo presence of 94 cases of infant deaths. It showed that 52 cases were due to non criminal deaths and 42 cases were criminal deaths. Criminal deaths by to omission were 25 cases and by commission were 17 cases. The study attributed the occurrence of infanticide to 3 reasons. **Firstly** the rise of population number in Cairo and subsequently over crowdedness that leads to illegal sexual relations and presence of hidden prostitute. These two conditions lead to illegal pregnancies and infanticide for birth concealment. The **second** cause is the absence of specific law for infanticide in Egyptian law and **lastly** to maternal psychosis (Helmi et al, 1979)

In a retrospective study of forensic examination of Danish cases of abandoned newborn infant corpses. Eleven newborn infant corpses were found. Causes of death were mentioned as asphyxia, brain injury or simply undetermined. Two-thirds of the newborn infants showed signs of violence. None of the newborn infants had congenital malformations (Gheorghe et al., 2011).

In the present study, omission of feeding, coverings or ligation of the umbilical cord resulted in infant deaths in 21.43 % of total cases. This was in agreement with the study of Rahman et al., (2013) who reported that the use of starvation and dehydration as means of infanticide. Also in agreement was the study of Catanesi et al., (2012) who mentioned that fatal child neglect due to starvation may be used by parents with mental or personality disorders as a method of filicide.

In agreement with the current work, the causes of death in study of infanticide in Eastren Croatia asphyxia of (smothering and strangulation) represented the highest percentage (37.5%), then head injuries (25%), omission represented (25%), and wounding with a sharp weapons (12.5%) of total cases (Marcikić et al., 2006).

In this work estimation of postmortem changes revealed that presence of putrefaction in 23.81% of total cases. Hypostasis was present in 76.19% of total cases. Rigor mortis was present in 31.43% of total cases. Neither adipocere nor mummification was detected.

This was recorded in two typical case reports of infanticide by Ong and Green (2003) in Malaysia. Case 1 concerned a body of a fully mature newborn fetus disposed in a rubbish bin. The umbilical cord was still attached to the body, with no reddening around the insertion. The lung floats in water denoted live birth but no cause of death could be elicited. Case 2 concerned a decomposed mature newborn found in a scrub forest. The internal organs of the body including the lungs showed advanced putrefaction, so no conclusion could be made about the cause of death.

In agreement with present work the study of Schulte et al., (2013) in Germany who mentioned that putrefaction was found in 27% of total neonaticide cases. Also in agreement was results of the study of Yamauchi et al., (2000) in Japan who reported that putrefaction was found in 25% of total infanticide cases. As well as the study of Marcikić et al., (2006) in Croatia who stated that putrefaction was found in 23.1% of total infanticide cases.

In the present work the time passed since death determined in 65.71% of total cases distributed as following: 17.14% within one day, 17.14% since 1-2 days, 8.57% since 3 days, 11.43% since 3-7 days, 2.38% since 7 days, 8.57% since 1-2 weeks. The time passed since death could not be determined in 18 cases which represented 34.29% of total cases because the corpses kept in the refrigerator.

It was mentioned that keeping the bodies of new born infants of neonaticide frozen since their death, preserved their bodies which was helpful for the postmortem investigation but interfered with the postmortem decomposition (Kozawa et al., 2012).

Female feticide-the selective abortion of female fetuses- resulted in killing of one million females in South Asian countries (India, Nepal, China and Bangladesh) annually by use of prenatal sex detection technologies which resulted in drop of the sex ratio of females to males. Legally it is a penal offence. Females killing is attributed to 3 reasons, **firstly** to the low social status of women, by the prospect of having to pay a dowry to the future bridegroom of a daughter. **Secondly** the preference of sons, as they offer security to their families in old age and can perform the rites for the souls of deceased parents and ancestors, daughters are perceived as a social and economic burden. **Thirdly** it is likely that women who have more sons are highly regarded and less likely to experience violence. The opposite related to women who have more daughters (Abrejo et al., 2009 and Ahmad, 2010).

Good evaluation of infanticide necessitates putting a standard protocols and checklists during the medicolegal examination of infanticide cases to facilitate comparability and to ensure the completeness of findings. Full-body X-rays or CT scans should be used to complete viability examinations (Schulte et al., 2013).

The lung flotation test is the main method used to assess infant's viability in different jurisdictions worldwide. The postmortem multislice computed tomography (pmMSCT) is useful in the detection of live birth signs. The extent of aeration of the peripheral alveoli was easily observable on the pmMSCT, so can

be used to differentiate between artificially and naturally aerated lungs (Guddat et al., 2013).

Unwanted pregnancy may associated with feticide, infanticide, or child abuse and neglect, which can be prevented by defending the basic human right of the fetus and infant to live, promoting social institutions and foster families for infants of unknown parentage (Kasule, 2003).

Conclusions and recommendations

Cases of infanticide are underestimated in Egypt, perhaps due to lack of reporting and missing of cases in places of concealments. Good evaluation of infanticide necessitates writing a complete and standard medicolegal report about cases. Minimization of infanticide necessitates establishment of a specific legislations for infanticide, increase public awareness to notify about infanticide cases, improve economic and education states especially for females in poor areas, prohibit illegal sexual relationships, treatment of pregnant mothers suffering from psychiatric disorders, increase the public awareness about reporting of the crime and attention to social care institution and prepare foster families for infants of unknown parentage.

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الملخص العربي

تقييم طبي شرعي لنمط قتل الوليد بمحافظة أسيوط، مصر من عام ٢٠٠٨ إلى ٢٠١٣ (دراسة مرجعية)

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قتل الوليد هو جريمة تمارس في كل المجتمعات منذ بداية الخليقة. أجريت هذه الدراسة الاسترجاعية بهدف تقدير حجم و تقييم نمط جريمة قتل الوليد في محافظة أسيوط خلال الفترة من عام ٢٠٠٨ إلى ٢٠١٣ وأيضا دراسة أسباب هذه الجريمة واقتراح حلول لها.

تم هذا التقييم من خلال فحص التقارير الطبية الشرعية الخاصة بحالات قتل الوليد التي وردت إلى مصلحة الطب الشرعي التابعة لوزارة العدل بأسيوط في تلك الفترة. وجرى تقييم الحالات من حيث العدد والتوزيع الموسمي و الجغرافي وطرق الإبلاغ و أماكن إخفاء الحالات ووجود أغطية من عدمه على المواليد والتعرف على هوية الضحايا و المشتبه بهم في الجريمة و معرفة نوع الجنس و حالة الحبل السري ومرحلة اكتمال الأشهر الرحمية للوليد و أسباب وفاته والوقت الذي مضى منذ حدوث الوفاة .

أظهرت الدراسة العثور على خمسة وثلاثين طفلا حديث الولادة خلال تلك الفترة. و قد وجد أكبر عدد من الحالات في عامي ٢٠١١ (٨ حالات) و٢٠١٢ (٨ حالات). حدثت أعلى نسبة من الحالات في شهور الشتاء والصيف اللذان مثلا ٤٢.٨٥ % و ٣١.٤٣ % من إجمالي الحالات الكلية على التوالي. تم العثور على نسبة من الحالات في مركز أبنوب و الفتح بنسبة ٢٨.٥٧ % ثم مركز منفلوط بنسبة ٢٢.٨٦ % من إجمالي الحالات الكلية على التوالي. من أكثر الأماكن التي تم فيها إخفاء الأطفال حديثي الولادة هي أكوام القمامة في الشوارع (٣١.٤٣%) و مياه الترع (٢٢.٨٦%) ، داخل وخارج المباني (٢٠%) و على الجسور (١٤.٢٩%) من الإجمالي. تم الكشف عن هوية الأطفال حديثي الولادة والمشتبه بهم في القتل بنسبة ٨.٥٧% من إجمالي الحالات الكلية تم العثور على أطفال حديثي الولادة وعليهم أغطية بنسبة ٥٤.٢٩% بينما تم العثور على أطفال حديثي الولادة بدون الأغطية بنسبة ٤٥.٧١ % من إجمالي الحالات الكلية . مثلت نسبة الإناث ٦٠ % وهى أعلى من نسبة الذكور البالغة ٤٠% من الإجمالي ،و وجد الحبل السري مربوطا برباط غير طبي بنسبة ٦٥.٧٢% من الإجمالي وقد بلغت نسبة الأطفال حديثي الولادة ممن أكمل الأشهر الرحمية ٨٨.٥٧ % بينما كانت نسبة ممن يكمل الأشهر الرحمية ١١.٤٣ % من إجمالي الحالات الكلية. و

كانت أكثر أسباب الوفاة شيوعا هي إصابات الرأس بنسبة ٤٨.٥٧% ثم الإهمال (الجوع والبرودة وعدم ربط الحبل السري) بنسبة ٢٨.٥٧% من إجمالي الحالات الكلية ، بينما كان سبب الوفاة غير معروف بنسبة ١٤.٢٩ % من إجمالي الحالات الكلية بسبب حالة التعفن المتقدمة. تم تحديد الوقت الذي مضى على الوفاة بنسبة ٦٥.٧١% بينما لم يتم تحديده بنسبة ٣٤.٢٩ % من إجمالي الحالات الكلية.

وتقترح هذه الدراسة لحل المشكلة إلى ضرورة و وضع تشريعات قانونية خاصة بجريمة قتل الوليد وكتابة تقرير طبي شرعي نموذجي عن الحالات، زيادة الوعي المجتمعي للبحث والإبلاغ عن حالات قتل الوليد وتحسين الحالة التعليمة والاقتصادية خاصة للإناث، وتفعيل الأدوار الأمنية والدينية لمنع العلاقات الجنسية غير الشرعية، والاهتمام بمؤسسات الرعاية الاجتماعية للمواليد مجهولي النسب و علاج الأمهات اللاتي لديهم اضطرابات نفسية.

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