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# A COMPARISON BETWEEN CLINICAL AND AUTOPSY DIAGNOSES OF PERINATAL DEATH REFERRED TO TEHRAN FORENSIC MEDICINE FROM 2012 TO 2016

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## ABSTRACT

Perinatal mortality is regarded as an important index of health in a community; therefore assessment the main cause of fetal and neonatal death is valuable. Substantial discrepancies exist between clinical diagnoses and findings at autopsy. Accordingly, the present study aimed to compare autopsy reports of stillbirths and neonates greater than 500 grams (under 28 days old) over a five year period from 2012 to 2016 that referred from Tehran hospitals to Tehran province forensic medicine dissection hall.  We compared the final pathological diagnosis with the clinical diagnosis. A total of 632 perinatal deaths including 80 (12/7%) stillbirths and 552 (87/3 %) neonatal deaths less than 28 days old were recorded during this period. The rate of neonatal autopsies were increased over five years from 55(10 %) in 2012 to 132(24%) in 2016.In 321cases (51%) the autopsy diagnoses confirmed the clinical diagnoses, in 282 cases (44/6 %) it changed the clinical diagnoses, in 17 cases (2/6 %), it significantly added to the clinical

diagnoses and in 12 cases (1/8 %) it was inconclusive. This study also demonstrates that fetal and neonatal autopsies continues to provide clinically useful data in 47/3 % of cases and remains a valuable tool in pediatric medicine.

**Keywords: Autopsy-clinical diagnosis-stillbirth-neonatal death**

## INTRODUCTION

Rate of stillbirth, as one of the important signs of development in a society, is a sensitive indicator for the quality of health care, living conditions and equity [1]. Perinatal mortality rate is regarded as an important index of health in a community [2]. Identifying the exact causes of infant mortality in developing countries is very important [3]. Every year nearly 45% of all under 5 child deaths are among newborn infants, babies in their first 28 days of life or the neonatal period. The vast majority of newborn deaths take place in developing countries where access to health care is low. The majority of all neonatal deaths (75%) occur during the first week of life, and between "25% to 45% occur within the first 24 hours [4]. Recognizing effective factors influencing perinatal mortality rate and promoting maternal knowledge about the importance of perinatal care during pregnancy could significantly reduce the perinatal mortality rate [5]. Autopsy has been a useful tool in clinical education, research, and quality monitoring of patient care. Especially in newborns, in whom clinical manifestations of many diseases may often be nonspecific; autopsy can be invaluable in determining the precise cause of death. Despite the recognized value of autopsy, general autopsy rates have declined significantly in recent years [6]. Autopsy findings in confirming or altering clinical diagnoses made prior to death is particularly valuable in the neonatal period, since not only is the cause of death significant, but also at least of equal import is the presence of disorders or diseases that may recur. The importance of an autopsy in the neonatal age group is especially important since the yield of unexpected findings is considerably greater than in other groups, and the information may prove invaluable for parents and families in planning other pregnancies. The death of a newborn is a tragic event and when contributing factors as to the cause of the death are discovered through a complete autopsy, parents can begin the healing process and plan future pregnancies realistically [7]. The perinatal period is generally defined as the period between 28weeks'gestation and one week of life, most

pathologists who perform fetal and neonatal autopsies consider any autopsy performed on the fetus or neonate to be a "perinatal autopsy" since the approach and skills needed to perform such autopsies are the same [8]. Diagnostic errors are defined as diagnoses that are missed, wrong, or delayed, as detected by some subsequent definitive test or finding [9]. This study was carried out to examine the correlation between clinical diagnoses at the time of death and autopsy findings in stillbirths and neonates under 28 days old who died in hospitals in Tehran from 2012 to 2016.

## MATERIAL AND METHODS

In this retrospective cross-sectional study during a five years period from 2012 to 2016, autopsy reports of stillbirths and neonates (under 28 days old) greater than 500 grams in the Tehran province forensic medicine dissection hall in Iran, were studied. The clinical and autopsy diagnoses were compared and categorized for each group (stillbirths and neonates) as follows: 1. Change (clinical and autopsy diagnoses discordant), 2. Add (significant unexpected findings noted on the autopsy, although the clinical diagnosis was not altered), 3. Confirm (clinical and autopsy diagnosis concordant), 4. Autopsy inconclusive. By examining the files from Tehran province

forensic medicine dissection hall and compared between pre mortem with postmortem diagnoses during 2012-2016, required information such as sex, gestational age, Birth weight, clinical major cause of death, other probable causes of death ,cause of death after autopsy, rate of autopsies each year, data were coded and analyzed by SPSS. The only exclusion criteria were incomplete clinical data.

## RESULTS

### Gender

### Stillbirths

The total of stillbirths was 49(61/2 %) male and 31(38/8%) female (Table 1).

### Neonates (under 28 days old)

The total of neonates were 322(58/3%) male and 229(41/5%) female and 1(0/2%) with ambiguous genitalia. (Table 1) and (Figure 1).

### Gestational age

### Stillbirths

There were 17 (21/2 %) (Between 22 completed weeks of gestation to 37 weeks of gestation), 63 (78/8 %) (Between 37 to 42 weeks of gestation) and no (0 %) (Above 42 weeks of gestation).

### Neonates (under 28 days old)

There were 164 (29/7%) preterm (under 37 weeks of gestation), 388 (70/3%) term (between 37 to 42 weeks of gestation) and no

(0 %) post term (above 42 weeks of gestation) (Figure 2).

**Birth Weight**

**Stillbirths**

There were 3(3/8 %) extremely low birth weight (500 - 1000 grams), 5(6/2%) very low birth weight (1000-1500 grams), 15(18/8%) low birth weight (1500-2500 grams) and 57(71/2%) normal weight (above 2500 grams) (Figure 3).

**Neonates (under 28 days old)**

There were 27(4/9 %) extremely low birth weight (500 - 1000 grams), 48 (8/7%) very low birth weight (1000-1500 grams),147( 26/6%) low birth weight (1500-2500 grams) and 330(59/8%) normal weight (above 2500 grams) (Figure 3).

**Clinical major cause of death**

**Stillbirths**

The most common causes of death were unknown 17(21/2%) and lung disorders 15(18/7%) respectively. (Table 2)

**Neonates (under 28 days old)**

The most common causes of death were congenital malformations 114(20/7 %) and unknown 111 (20/1 %) respectively. (Table 2)

**Autopsy major cause of death**

**Stillbirths**

The most common causes of death were maternal underlying diseases (such as PROM, DM, HTN, Chorioamnionitis) 17(21/2%) and fetal disorders (such as congenital malformation, hydrops fetalis) 15(18/8 %) respectively. (Table 3)

**Neonates (under 28 days old)**

**The most common causes of death were congenital malformations 140(25/4%) and infections 113      (20/5%) respectively. (Table 3)    Concordance Rate**

**Stillbirths**

Regarding the concordance between the cause of death established by the clinician and the cause of death established by the pathologist, In 31 cases (38/7%) the autopsy diagnoses confirmed the clinical diagnosis, in 43 cases (53/7%) it changed the clinical diagnoses and in 6 cases (7/5%) it was inconclusive (Figure 4).

**Neonates**

Regarding the concordance between the cause of death established by the clinician and the cause of death established by the pathologist, In 290cases (52/5%) the autopsy diagnoses confirmed the clinical diagnosis, in 239 cases (43/3%) it changed the clinical diagnoses, in 17 cases (3/1%) it significantly added to the clinical diagnoses and in 6 cases (1/1%) it was inconclusive (Figure 4).

**Concordance Rate**

**Stillbirths**

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**Rate of autopsies each year**

**Stillbirths**

The autopsy rate declined from 26/2% to 8/7% during five years (Figure 5).

**Neonates (under 28 days old)**

The autopsy rate increased from 55 (10%) to 132 (24%) during five years (Figure 5).

**Table 1: Gender**

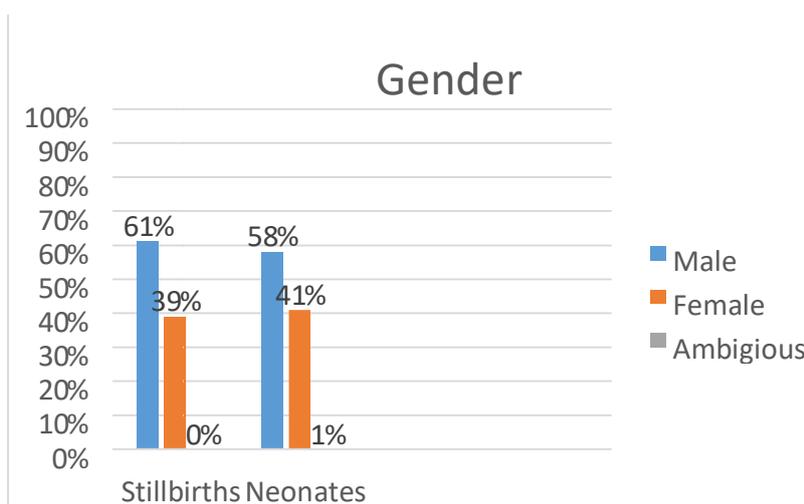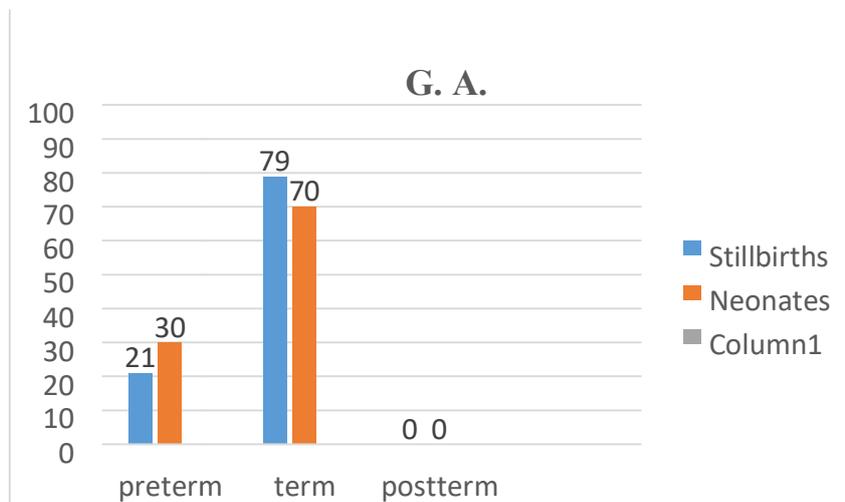| Gender | Male | Female | Ambiguous |
|---|---|---|---|
| Stillbirths | 49 (61/2%) | 31 (38/8 %) | 0 |
| Neonates | 322 (58/3%) | 229 (41/5%) | 1 (0/2%) |



**Figure 1: Gender**

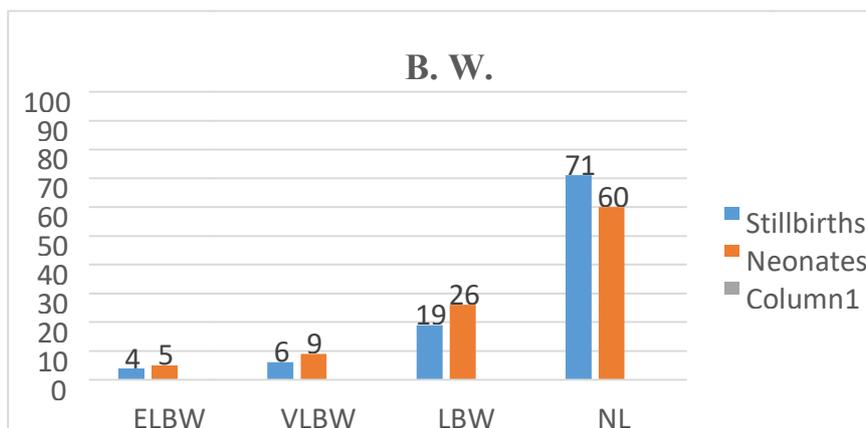**Figure 2: Gestational Age**



**Figure 3.The weight in stillbirths and neonates.**

**Table 2: Clinical major cause of death in stillbirths and neonates**

| Clinical Diagnosis | Prematurity | Lung disorder | Congenital disorder | Encephalo pathy | Infection | Metabolic disorder | IVH | Unknown | Asphyxia | Fetal disorder | Maternal disorder | Placental disorder | Others |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Stillbirths** | 5 (6/3%) | 7 (8/8%) | 12 (15%) | 0% | 2 (2/5%) | 0% | 2 (2/5%) | 6 (7/5%) | 0% | 15 (18/8%) | 17 (21/3%) | 14 (17/5%) | 0 |
| **Neonates** | 77 (13/9%) | 110 (19/9%) | 140 (25/4%) | 5 (0/9%) | 124 (22/5%) | 0% | 24 (4/4%) | 6 (1/1%) | 8 (1/4%) | 5 (0/9%) | 8 (1/4%) | 1 (0/2%) | 3 (0/6%) |

**Table 3: Autopsy major cause of death in stillbirths and neonates**

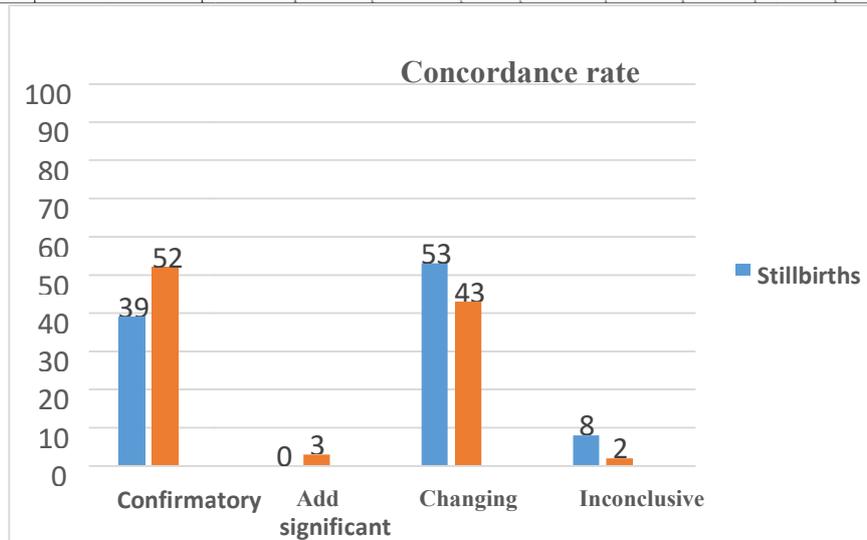| Autopsy Diagnosis | Prematurity | Lung disorder | Congenital disorder | Encephalo pathy | Infection | Metabolic disorder | IVH | Unknown | Asphyxia | Fetal disorder | Maternal disorder | Placental disorder | Others |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Stillbirths | 5 (6/3%) | 7 (8/8%) | 12 (15%) | 0% | 2 (2/5%) | 0% | 2 (2/5%) | 6 (7/5%) | 0% | 15 (18/8%) | 17 (21/3%) | 14 (17/5%) | 0 |
| Neonates | 77 (13/9%) | 110 (19/9%) | 140 (25/4%) | 5 (0/9%) | 124 (22/5%) | 0% | 24 (4/4%) | 6 (1/1%) | 8 (1/4%) | 5 (0/9%) | 8 (1/4%) | 1 (0/2%) | 3 (0/6%) |



**Figure 4: The concordance between clinical diagnosis and autopsy diagnosis in stillbirths andneonates**
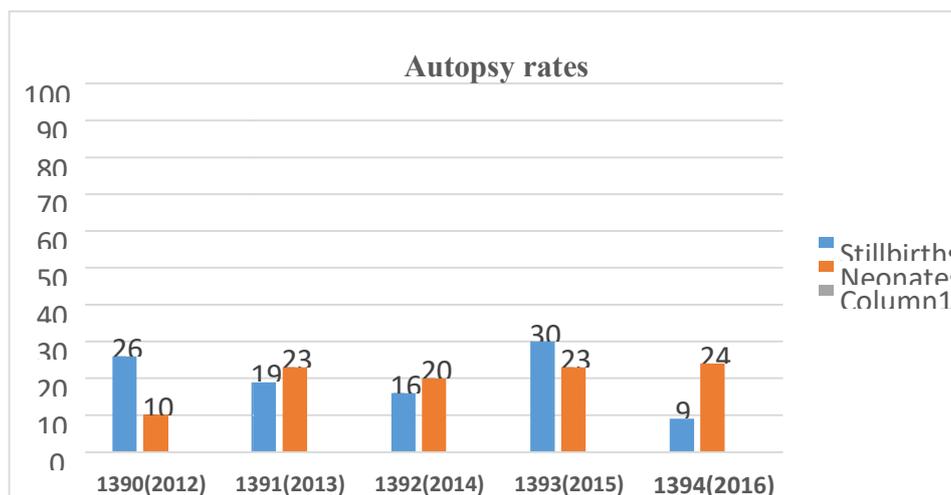


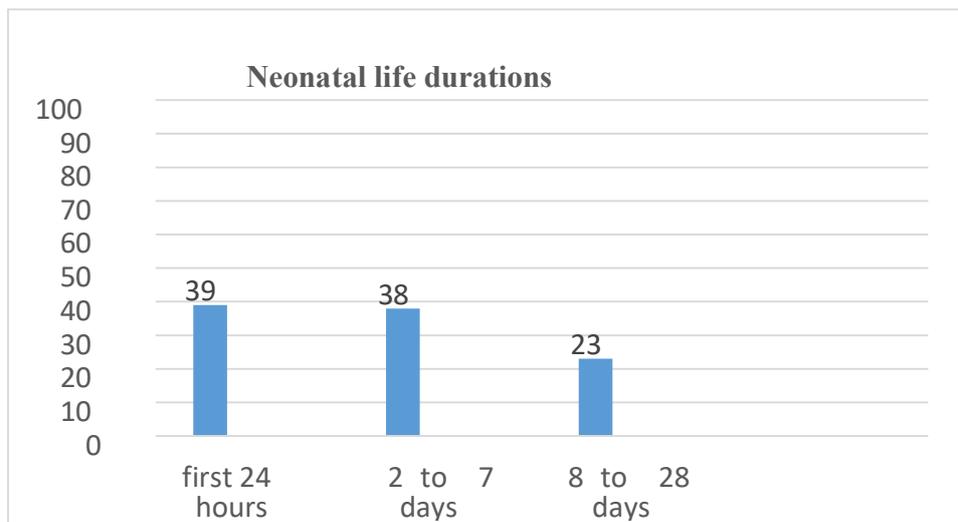**Figure 5: The rate of Autopsies year**

**Figure 6 : Neonatal Durations**

## DISCUSSION

The main goal of this study was to find the cause of perinatal death after autopsy and to compare between diagnoses before and after autopsy in stillbirths and neonates referred to Tehran Autopsy Hall and secondary objectives, to find the rate of autopsy during five years.

The findings of this study showed that in most cases of stillbirths clinical diagnoses were incompatible with autopsy diagnoses, and most frequent missed or misdiagnosed pathologies by the clinicians in case of stillborn and dead fetuses were maternal underlying diseases, and both of these results are in contrast with the results of other studies performed in Babol and Bucharest [1, 21].

Among the clinical major causes of death in stillbirths the most common causes were unknown and lung disorders respectively, which are in contrast with the results of other studies conducted in Babol [1], Turkey [18] and Bucharest [21].

The findings of this study showed that the rate of stillbirth autopsies were declined over five years significantly, this result is consistent with the result in UK [17].

our findings also showed that the rate of neonatal autopsies were increased over five years which is in contrast with the results of other studies conducted in Tehran, Scotland, Wales and Turkey [10, 14, 17, 18].

Among the clinical major causes of death in neonates the most common causes were congenital malformations which is consist with the results of other studies conducted in

Babol [1], Israel [15] and Japan [19] but also in contrast with studies performed in south Africa [11], Lahour [12], Peshawar [13], Yazd [2] and Kerman [20].

In the present study the most common autopsy cause of death in stillbirths was maternal underlying diseases which is in contrast with the result of study performed in Turkey [18].

In the present study the most common autopsy cause of death in neonates was congenital malformations which is in contrast with the results of studies conducted in Tehran [10] and Turkey [18].Earlier studies have reported higher yields of new information from perinatal autopsies, ranging from 23% to 26% [16, 10, and 14] but our findings in the present study showed new information from perinatal autopsies in 46/4%.

The results of this study does not approve findings from Bucharest [21].Our findings showed that in most cases of neonates clinical diagnoses were incompatible with autopsy diagnoses and in this sense is in contrast with performed studies in Tehran [10], Scotland [14], and Ankara [16].

## CONCLUSION

Our findings in the present study showed new information from perinatal autopsies and provided useful data in 46/4% of cases;

therefore perinatal autopsy remains an invaluable tool in pediatric medicine.

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