An evaluation of stillbirths in İstanbul by examining death certificates

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Abstract

Aim: Despite the fact that the frequency of stillbirth is estimated to be about the same as that of early neonatal deaths, stillbirth records and statistics are not kept on a regular basis worldwide and their causes cannot be determined. The aim of our study was to examine the causes and characteristics of stillbirths in Istanbul.

Material and Methods: All death certificates of 2011 archived in 8 District Cemetery Directorships, which manage 322 cemeteries within the boundaries of Istanbul Metropolitan Municipality, were examined. Based on the burial licences, weight, gestational weeks, the main cause and causes of death related to stillbirth were analyzed. Cervical insufficiency, placenta abnormalities, preeclampsia, complications of multiple pregnancy, chronic diseases of mothers, conditions including malignancy in mothers were evaluated under the title of “maternal and gestational causes.” Intrapartum infections, meconium aspiration, and asphyxia were evaluated under the title of “perinatal causes.”

Results: A total of 2078 stillbirths and 128 abortus records were found among the death certificates. Nineteen of the abortus records and 109 stillbirths were misidentified. A total of 1988 stillbirth records were examined, of which 68.4% were low-birth-weight babies (<2500 g). Approximately three quarters of the stillbirths were mild preterm and extremely preterm babies, whereas 10% were at or more than 37 gestational weeks. The cause of death was not known in 30% of the stillbirths.

Conclusions: The cause of death was not known in a significant portion of stillbirths in Istanbul. Recordings should be made more meticulously directed to the cause of death. The cause of stillbirth in term babies is another research subject. Regional and global epidemiologic studies are needed to understand the causes of stillbirths and thus to take necessary precautions. (Turk Pediatri Ars 2017; 52: 92-7)

Keywords: İstanbul, stillbirth, causes of stillbirth, prematurity

Introduction

The causes of mortality in children below the age of five years are specified with global and regional epidemiologic studies, and the mortality rate is rapidly decreasing with preventions directed to this issue throughout the world and in our country (1-3). Recent statistics show that more than half of the mortality below the age of five years occurs in the neonatal period and a great part is in the early neonatal period (2, 3). Although the rate of stillbirth is approximately the same as the early neonatal mortality rate, stillbirth recordings and statistics are not yet kept regularly worldwide and the causes cannot be determined (1, 4, 5). Currently, the majority of stillbirths mostly occur in term or late preterm babies in low and moderate income countries, and they especially occur intrapartum. These stillbirths occur in babies with no congenital anomalies who would not confront problems that may be observed in preterm babies if survival occurred (6). Research is needed in this area, which is important in terms of public health (4, 7, 8).

Expulsion of a fetus weighing <500 g and its annexes completely or partially outside the uterine cavity be-
fore the 20th gestational week (GW) without mechanical or pharmacologic intervention is called “abortion” (9). The term “stillbirth” is used for babies who do not have a heart beat and spontaneous respiration at birth, who do not respond to resuscitation for 20 minutes, and who have completed 22 GWs (≥22 GWs) and/or have a birth weight of ≥500 g. Perinatal mortality involves deaths between the 22nd GW and postnatal 7th day and fetuses and newborns weighing ≥500 g, if the GW is not known (10, 11). For international statistical comparisons, the World Health Organization (WHO) recommends that perinatal statistics should be made including babies with a birth weight of ≥1000 g and/or who have completed ≥28 GWs; very-low-birth-weight babies should be excluded (10). Therefore, many statistical studies related with stillbirths are conducted in accordance with the above mentioned WHO criteria.

Currently, the most common source of information used in relation with deaths in Turkey is yearly mortality statistics based on reports from provincial centers and county towns published by the Turkish Statistics Institution (TSI). However, these statistics do not include data related with stillbirths (12, 13). Information related with stillbirths in our country is based on a limited number of regional studies (14, 15). In this study, it was aimed to examine the characteristics and causes of stillbirths that occurred in 2011 throughout the province of Istanbul.

Material and Methods

The data collection stage of the study was conducted between January 2013 and December 2013 by obtaining special approval from Istanbul Metropolitan Municipality (IMM) Cemeteries Directorship and approval from Istanbul University, Faculty of Medicine Ethics Committee (21.12.2012/21). All death certificates were examined related to 2011 in 8 regional cemetery directorships belonging to the IMM Cemeteries Directorship, which involves 322 cemeteries within the borders of Istanbul Metropolitan Municipality.

Burial approval documents found in the cemetery directorships were archived as separate files by districts and countries. In addition to the files that included burial approval documents, a separate book was kept for recording in each cemetery directorship. It was observed that records were also kept electronically, in addition to filed death certificates and blood records. Considering that errors might have made during the transfer of records to the electronic media, the study was based on the information found in the burial approval documents.

Noting that the term stillbirth describes babies with no heart beat or spontaneous respiration at birth, who do not respond to resuscitation for 20 minutes, who have completed ≥22 GWs, and/or weigh ≥500 g (10), during this study, it was noted that death certificate forms were also completed for fetuses aged 20 GW and below in the province of Istanbul, and these fetuses were buried in cemeteries; there is no clear period for stillbirths in the Health Legislation in our country. In our study, babies with no heart beat and spontaneous respiration at birth, who did not respond to resuscitation for 20 minutes and who completed ≥22 GWs and/or weighed ≥500 g were defined stillbirth.

Babies with a birth weight of <2500 g are considered as low birth weight and babies with a birth weight of <1500 g are considered as very low birth weight. Babies with a gestational age below 37 GWs are considered preterm. Preterm babies are divided into two groups according to GW as mild preterm, between 32 0/7 GWs and 36 6/7 GWs (34 0/7 - 36 6/7 GW: late preterm), and extremely preterm between 24 0/7 GWs and 31 6/7 GWs. “Early term” is used for 37 0/7 – 38 6/7 GWs, “term” is used for 39 0/7 – 41 6/7 GWs, and “postterm” is used for ≥42 0/7 GWs (16). In our study, classifications were made according to these definitions.

Multiple causes of mortality were reported in 74% of the death certificates in which the cause of mortality was specified. When classifying causes of mortality, the main cause of mortality that led to death was considered. For example, the main cause of death was recorded as cervical insufficiency in a cases where the cause of mortality was prematurity and cervical insufficiency. Prenatal infections, cervical insufficiency, placental anomalies, preeclampsia, multiple pregnancy complications, maternal chronic diseases, and maternal malignancy were included under the title of maternal and pregnancy-related causes. Perinatal causes included the diagnoses of meconium aspiration and asphyxia. Stillbirths that were recorded as unknown cause and for which no cause of mortality was specified were evaluated in the group “unknown cause.”

Statistical analysis

Number Cruncher Statistical System 2008 (NCSS, Kaysville, Utah, USA) statistical software was used for sta-
statistical analyses. The numbers and percentages of the subjects are expressed.

Results

In this study, it was found that a total of 53,109 deaths occurred between January 1st, 2011, and December 31st, 2011, within the borders of IMM according to the death certificate data of 2011 archived in IMM Cemeteries Directorship, and 3586 of these were aged under 5 years. One thousand nine hundred sixty-nine cases were recorded as “stillbirth” and 128 were recorded as “abortion.” Nineteen of the abortion cases were evaluated as stillbirth because they were not compatible with the definition of abortion. One hundred nine records that were compatible with the definition of abortion were not included in the stillbirth group, though they were labeled as stillbirth. Thus, a total of 1988 records were examined as stillbirths.

Some 56.1% of the stillbirths occurred in very-low-birth-weight babies and 68.4% occurred in low-birth-weight babies. Thirty percent of all stillbirths occurred in babies with a birth weight below 1000 g (Table 1).

The distribution of stillbirths by GW is shown in Table 2. Ten percent of the stillbirths occurred in babies who had a gestational age older than 37 GWs.

The cause of mortality was reported in 70.1% of cases that were labeled as stillbirth. Only “premature delivery” was written as the cause in 35.2% of these records. Nineteen records that were examined among stillbirths, because they were not compatible with the definition of abortion though recorded as abortion, were included in the “unknown cause” group, because no additional cause of mortality was recorded. The causes of stillbirths by gestational weeks are shown in Table 3.

The cause of mortality was not specified in 24% of preterm babies. When evaluated with records in which the cause of mortality was recorded as “premature delivery” in this group, the rate of stillbirth of unknown cause increased to 67.5%. The cause of mortality was not specified in 60% of stillbirths.

Discussion

In this study, it was found that most stillbirths occurred in babies with low birth weight and low GW. On the other hand, 10% of stillbirths occurred in babies older than 37 GWs. In the whole group, the cause of mortality was

Table 1. Distribution of stillbirths by birth weights

<table>
<thead>
<tr>
<th>Birth weight (g)</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;1000</td>
<td>603</td>
<td>30.3</td>
</tr>
<tr>
<td>1000-1499</td>
<td>513</td>
<td>25.8</td>
</tr>
<tr>
<td>1500-1999</td>
<td>136</td>
<td>6.8</td>
</tr>
<tr>
<td>2000-2499</td>
<td>109</td>
<td>5.5</td>
</tr>
<tr>
<td>&gt;2500</td>
<td>211</td>
<td>10.6</td>
</tr>
<tr>
<td>Unknown</td>
<td>416</td>
<td>21.0</td>
</tr>
<tr>
<td>Total</td>
<td>1988</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 2. Distribution of stillbirths by gestational week

<table>
<thead>
<tr>
<th>Gestational week (GW)</th>
<th>n (%)</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>22 0/7 – 27 6/7</td>
<td>1199</td>
<td>60.3</td>
</tr>
<tr>
<td>28 0/7 – 31 6/7</td>
<td>121</td>
<td>6.1</td>
</tr>
<tr>
<td>32 0/7 – 33 6/7</td>
<td>126</td>
<td>6.3</td>
</tr>
<tr>
<td>34 0/7 – 36 6/7</td>
<td>158</td>
<td>8.0</td>
</tr>
<tr>
<td>37 0/7 – 38 6/7</td>
<td>102</td>
<td>5.1</td>
</tr>
<tr>
<td>39 0/7 – 41 6/7</td>
<td>93</td>
<td>4.7</td>
</tr>
<tr>
<td>≥42</td>
<td>5</td>
<td>0.2</td>
</tr>
<tr>
<td>Unknown</td>
<td>184</td>
<td>9.3</td>
</tr>
<tr>
<td>Total</td>
<td>1988</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 3. Distribution of causes of mortality in stillbirths by gestational week

<table>
<thead>
<tr>
<th>Unknown cause</th>
<th>22 0/7 – 27 6/7</th>
<th>28 0/7 – 31 6/7</th>
<th>32 0/7 – 33 6/7</th>
<th>34 0/7 – 36 6/7</th>
<th>37 0/7 – 38 6/7</th>
<th>39 0/7 – 41 6/7</th>
<th>≥42</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>n (%)</td>
<td>n (%)</td>
<td>n (%)</td>
<td>n (%)</td>
<td>n (%)</td>
<td>n (%)</td>
<td>n (%)</td>
<td>n (%)</td>
<td>n (%)</td>
</tr>
<tr>
<td>Premature delivery</td>
<td>36 (19.6)</td>
<td>497 (41.5)</td>
<td>60 (49.5)</td>
<td>56 (44.4)</td>
<td>51 (32.3)</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Congenital anomalies</td>
<td>48 (26.1)</td>
<td>317 (26.4)</td>
<td>21 (17.4)</td>
<td>30 (23.8)</td>
<td>34 (21.5)</td>
<td>22 (21.6)</td>
<td>8 (8.6)</td>
<td>480 (24.1)</td>
</tr>
<tr>
<td>Maternal and pregnancy-related causes</td>
<td>46 (25.0)</td>
<td>89 (7.4)</td>
<td>6 (5.0)</td>
<td>9 (7.1)</td>
<td>11 (7.0)</td>
<td>12 (11.8)</td>
<td>13 (14.0)</td>
<td>-</td>
</tr>
<tr>
<td>Perinatal causes</td>
<td>8 (4.4)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>4 (2.5)</td>
<td>5 (4.9)</td>
<td>9 (9.8)</td>
<td>1 (20)</td>
</tr>
<tr>
<td>Unknown cause</td>
<td>46 (25.0)</td>
<td>296 (24.7)</td>
<td>34 (28.1)</td>
<td>31 (24.6)</td>
<td>58 (36.7)</td>
<td>63 (61.7)</td>
<td>63 (67.7)</td>
<td>4 (80)</td>
</tr>
<tr>
<td>Total</td>
<td>184 (100)</td>
<td>1199 (100)</td>
<td>121 (100)</td>
<td>126 (100)</td>
<td>158 (100)</td>
<td>102 (100)</td>
<td>93 (100)</td>
<td>5 (100)</td>
</tr>
</tbody>
</table>

GW: Gestational week

* Nineteen stillbirths that were not compatible with the definition of abortion were between 22 0/7-27 6/7 GWs and examined in the group “stillbirths with unknown cause”.
not known in 30% of the subjects and it was noted that the cause of mortality was not specified in more than half of stillbirths that occurred in term babies. However, the rate of absence of specification of the cause reduced as the gestational week decreased. The major causes of mortality in stillbirths where the cause of mortality is defined as “preterm delivery” should be evaluated in detail. These results show that research directed to the etiologies of stillbirths should be performed in our country. On the other hand, debates related with the classification of stillbirths are continuing (17).

Currently, a reduction in the prevalence of stillbirths is not observed, despite significant developments in the area of pediatrics (18). Therefore, studies related with the causes of stillbirths are significant in terms of child health. It is known that approximately 4 million babies die in the neonatal period and 3.2 million stillbirths occur yearly (4, 19). This figure may be higher because it is thought that stillbirth records are kept deficiently (4, 20). On the other hand, sufficient studies related with this issue are not being conducted, causes are not being specified, and regular regional and/or global statistical data cannot be collected (4, 21, 22).

Although the definitions of stillbirth vary from country to country (Great Britain ≥24 GWs, New Zealand ≥20 GWs, Turkey ≥ 22 GWs), the WHO recommends that fetuses in the third trimester (completed ≥28 GWs and/or ≥1000 g) who have no heart beat and spontaneous respiration at birth and who do not respond to resuscitation for 20 minutes should be considered as stillbirth for statistical comparisons (4, 10). In a comprehensive study conducted with data obtained from 157 countries (ministries of health, national statistics institutions, national representative household questionnaires, websites, and unpublished national data), the prevalence and causes of stillbirth between 2000 and 2015 were investigated (4). In this study in which stillbirth was defined in accordance with the WHO criteria, it was reported that the rate of stillbirth in 2000 was 24.7% in 1000 live births, and reduced to 18.4% in 1000 live births in 2015 (4). In developed countries, this prevalence is less than 2 in 1000 live births, whereas it is 40 in 1000 live births in developing countries. According to the Turkish Statistics Institution, 212,607 live births occurred in 2011 in the province of Istanbul (23). In our study, it was found that 3.7 stillbirths in 1000 live births (n=789) occurred when the WHO criteria were considered (excluding 1199 subjects who were between 22 and 28 GWs).

The fact that this prevalence was close to the stillbirth prevalence found in developed countries suggests easy access to healthcare services and good prenatal care in Istanbul, which is a metropolis. According to the definition of stillbirth that is valid in our country (completed ≥22 GWs and/or ≥500 g), it was found that this prevalence was 9.4 in 1000 live births. This prevalence shows that the stillbirth prevalence found in the Marmara region (14.7%) decreased when compared with the multi-center study conducted in 1999 in Turkey (15).

According to our results, 10% of the stillbirths in 2011 in Istanbul were older than 37 GWs and the cause was not specified in the majority of these stillbirths. In some studies, it was reported that a portion of early neonatal deaths were recorded as stillbirth because of ineffective neonatal resuscitation (6, 21, 24). Therefore, it is important to investigate the causes of mortality in stillbirths with a standardized classification (stillbirths during labor, stillbirths before labor, and labor-related stillbirths) and to establish control systems in relation with accurate establishment and use of a stillbirth recording system (17, 25).

It is predicted that approximately 1 million stillbirths occur during labor yearly worldwide and this rate constitutes approximately one quarter of all stillbirths (21). It is thought that most of these stillbirths are related with asphyxia that develops during delivery. However, there is no definite diagnostic test to support this view. Cord blood gases, Apgar score, and clinical evaluation are insufficient to help in the diagnosis (26). We could also not make an evaluation in this issue in our study. The most common five causes of stillbirth include delivery complications, maternal infections such as syphilis, maternal diseases (e.g., hypertension, diabetes), fetal growth retardation, and congenital anomalies (27). In studies in which the causes of stillbirth were investigated with fetal autopsy, the most common cause was reported as problems related with the placenta (placental failure and umbilical cord complications). This was followed by congenital anomalies and maternal causes (e.g., preeclampsia, sepsis) (28, 29). It has been reported that maternal and pregnancy-related causes or perinatal causes were observed more frequently as a cause of stillbirth in underdeveloped and developing countries, whereas causes that were difficult to prevent, including severe prematurity (<32 GWs) became prominent in developed countries (8). Similarly, it was found that the majority of cases were
extremely preterm in our study. Among the causes of stillbirth, premature delivery was the leading cause and this was followed by congenital anomalies and maternal-pregnancy-related causes. Premature delivery is not among the causes of stillbirth, but extreme prematurity is considered an unpreventable cause of stillbirth. We found that records in which the cause of stillbirth was specified as premature delivery constituted 25% of all stillbirths. It may be thought that records in which the cause of stillbirth was specified as premature delivery with a gestational age <28 GWs (10% of all stillbirths) might have occurred during labor and arose from erroneous definitions and the inability to determine or specify the main cause of mortality.

One of the limitations of our study was the fact that it was conducted in only one province of our country. However, this study may give an idea about the whole of the country because the province of Istanbul is a center that accepts immigrants from all over Turkey. It is noted that the other studies conducted in this area were hospital-based studies, rather being community based (14, 15). The fact that our study was community based and conducted with cemetery records enabled clear data that could be evaluated statistically. Therefore, our study presents significant information.

According to our results, the number of stillbirths with unknown cause is very high. Therefore, additional information related with cause should be included in the classification of stillbirth; this information should be included in records and importance should be given to autopsy performance.

References

6. McClure EM, Goldenberg RL. Improved data informs efforts to end preventable stillbirths. The Lancet Glob Health 2016; 4: e70-1. [CrossRef]
25. Lawn JE, Kerber K, Enweronu-Laryea C, Cousens S. 3.6 million neonatal deaths--what is progressing and what is not? Semin Perinatol 2010; 34: 371-86. [CrossRef]