Comparison of Stillborn Birth Weights and Postmortem Weights

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Abstract

Objective: To compare the agreement (concordance) of fetal birth weights (BW), and the postmortem weights (BMW) of stillborns.

Methods: Birth weights obtained by the nurses in the labor and delivery (LDR) were compared with the weights obtained prior to the postmortem examination prospectively in 110 stillborns. The affects of gestational age, degree of maceration and time elapsed from delivery to postmortem examinations were also examined.

Results: There were 45 female and 65 male stillborns in the study. The gestational ages ranged from 17 to 40 weeks. Degree of maceration ranged from 0 to 5; 0 being no maceration and 5 representing the most extreme condition, which was mummification. There was a decrease in the weights of all stillborns when their birthweights and postmortem weights were compared. The average relative weight loss was 7.3%. When all the variables were examined, only the degree of maceration was identified to play a significant role ($p=0.008$). Higher the degree of maceration meant more weight loss.

Conclusion: There is significant discrepancy between the birth and postmortem weights of stillborns. While gender, gestational age and time elapsed from delivery to postmortem examination did not have a significant
impact, degree of maceration affected this observed weight loss. In stillborns, birth weights are more accurate than the postmortem weights.

**Introduction**

Body weight is one of the most significant parameters in the assessment of growth in the developing organisms. Postmortem examination plays an essential role in our efforts to elucidate the causes of stillbirth. Measuring the body weight is an integral part of this process. Initial weights of the stillborns are routinely obtained in the delivery room usually within minutes of delivery. Due to our initial observations of inconsistencies in these two values, we decided to compare the weights obtained at birth and before the postmortem examination in a prospective manner. The possible effects of gestational age, duration of the elapsed time from delivery to the postmortem examination and degree of maceration on the weight of the fetus were analyzed.

**Methods**

Over a period of a year beginning in January 2002, 110 stillborns were prospectively evaluated for birth and postmortem weights, gestational age, degree of maceration and the time elapsed from delivery to the time of the postmortem examination. The birth weights of these stillborns obtained immediately after delivery and they were weighed again before the initiation of the postmortem examination. Clinically determined gestational ages were used
in our evaluations. Degree of maceration was determined using a standardized grading system that ranged from 0 (no maceration) to 5 (maximum degree of maceration – mummification) (Table 1). The scales that were used in both locations were the same make and model (Fisher-xxxxx, model xxxx) and had been maintained by the same team of technicians. The temperature of the morgue was monitored as part of the CAP requirements and did not show any aberrations. The ambient room temperatures were similar in both locations and did not differ between seasons. Immediately after delivery the fetuses were weighed with one or two plastic cord clamps and one or two absorbent sheets then they were placed in special body bags (made by xxxxx®) and kept in this manner in the morgue. Postmortem weights were obtained without the body bag but with the cord clamps and absorbent pads. The weights were recorded in grams and values rounded up to two decimal places.

Statistical analysis was performed using

Results

There were 45 female and 65 male stillborns comprising the 110 cases in the study. Gestational ages ranged from 17 to 40 weeks. There were 12 cases ≤19 weeks gestational age. Days elapsed from delivery to the postmortem examination ranged from 0 to 5. The average was 000 days. There was only one case that underwent a postmortem examination after 5 days. Placentas were
available and examined in all the cases. Distribution of major diagnoses made after the postmortem and placental examination is shown in Table 2.

In this prospective study when we compared the birth weights with postmortem weights of 110 stillborns, we found that relative postmortem weights were consistently 7.3% was lower than their birthweights. Gender, birthweight, gestational age and elapsed time from delivery to the postmortem examination did not have a measurable effect on the weight loss. Stillborns, who had a higher degree of maceration lost more weight.

**Discussion**

The first essential step when examining the embryo, fetus, or infant is to determine where the case fits in the scale of human development. Typically, human form, function, and size change in a normal and predictable manner from conception. If pathologic processes are to be understood, the changes during normal growth and development must have reference either to the age of the subject or to the stage of gestation. The most obvious change with time is an increase in size or mass, and the simplest view of human fetal and infant development would regard weight as the main criterion needed for the assessment of fetal maturity. Small newborns have more significant morbidity and mortality than individuals in any other comparable time of life [1-3], and
the smaller the baby, the greater the risk. Premature stillborns weigh less than
their liveborn counterparts.

For similar reasons, weight plays a major role in the evaluation of stillborns
in attempts to identify the cause and the classification of death. In the absence
of reliable dates, the weights of the stillborns are used to distinguish a second
trimester spontaneous abortion from a stillbirth. Currently in the United States
the most common definition of stillbirth is a fetal death occurring at \( \geq 20 \) weeks
gestational age or \( \geq 350 \) g birth weight. So the weight of the stillborn, especially
when the gestational age is not known, is especially significant and weighing
errors result in unwanted consequences.

It is a known fact that the bodies if left exposed to the forces of nature are
affected according to the prevailing conditions. In dry and hot climates in the
loss of water and weights is fast. In wet and hot climates it takes longer for the
body to decompose. In wet and cold climate the decomposition takes even
longer. During the interval from fetal death until delivery, the retained fetus
undergoes maceration, a progressive deterioration of external and internal
macroscopic and microscopic features. Maceration is characterized by softening
and peeling of the skin, discoloration and softening of viscera, and fluid
accumulation in body cavities. These changes are nonputrefactive and result
from fetal immersion in amnionic fluid and digestion of fetal tissues by autolytic enzymes.

The most likely explanation of the effects of maceration after delivery is fluid loss from the fetal body surface. In advanced stages of maceration, loss of epidermis increases. This results in the increase of the raw area where fluid can be lost in some manner. Despite the stillborn were wrapped, placed in special body bags and preserved in temperature-controlled environments, fluid loss from these exposed areas could not be avoided. Since the bodies were wrapped in special absorbent sheets, fluid loss was probably in the form absorption rather than evaporation. Although in adults small fluctuations of weight do not carry any clinical significance, in the fetal period any error in the measurement of weights will carry significant consequences.

In conclusion, we have shown the discrepancy between the birth and postmortem weights of the stillborns and we are recommending to use the birthweights in the investigation of the stillbirths whenever they are available.
References


### Table 1. Description of grades of maceration

<table>
<thead>
<tr>
<th>Physical Findings at PM Examination</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>No maceration. Tissue appears normal.</td>
<td>0</td>
</tr>
<tr>
<td>Desquamation involving ≤ 1% of total body surface and brown-red discoloration of umbilical cord stump. Tissue appears red/pink and fresh with focal discoloration.</td>
<td>1</td>
</tr>
<tr>
<td>Desquamation of face, abdomen or back involving ≥1% and ≤5% total body surface. Tissue appears red/pink and fresh with focal discoloration and serous fluid collection.</td>
<td>2</td>
</tr>
<tr>
<td>Desquamation involving &gt; 5% of body surface. Tissue appears red/pink and mixed with brown.</td>
<td>3</td>
</tr>
<tr>
<td>Total brown skin discoloration. Tissue appears brown/gray.</td>
<td>4</td>
</tr>
<tr>
<td>Mummification. Tissue appears gray.</td>
<td>5</td>
</tr>
</tbody>
</table>

### Table 2. The distribution of diagnoses of the 000 stillborns in the study