Abstract
This study is a hospital based cross sectional study carried out upon 90 preterm infants admitted to Neonatal Intensive Care unit in Tikrit Teaching Hospital through the period from the 1st of February to the end of May 2008, their gestational ages were ranged from 28 – 36 weeks and their body weights were range from 800 – 2300g. The aim of this study is to evaluate the role of anterior fontanel ultrasonography in preterm infants, using special questionnaire, a physical examination was conducted and all preterms were sent for cranial ultrasound examination through the anterior fontanel. The frequency of intracranial findings was (30%), (7.40%) had germinal matrix hemorrhage, (11.11%) had intraventricular hemorrhage, (29.63%) had periventricular leukomalacia and (11.11%) had periventricular leukomalacia and (51.86%) had intraventricular hemorrhage, (51.86%) had germinal matrix hemorrhage, (51.86%) had intraventricular hemorrhage, (75%) of gestational ages 28 – 30 weeks, (47.61%) of 31 – 33 weeks and and (9.44%) of 34 – 36 weeks, (47.37%) of body weights 800 – 1300 g, (47.37%) of 1300 – 1800g and (11.37%) of 1800 – 2300g. Case fatality rate among preterms with intracranial findings was (40.75%).

Introduction
The fetal or preterm infant’s brain is vulnerable to both hemorrhagic and ischemic injury during the late second and early third trimesters (1). This is due to vascular, cellular and anatomical features of the developing brain, and the endency for preterm infants to experience periods of physiological instability at a time when they have limited cerebral circulatory autoregulation (2). Hemorrhagic lesions (GM and/or IVH) can be restricted to the GM, they can include bleeding into the ventricles (with or without the development of hydrocephalus) or in the worst cases, they can be found in the brain parenchyma (3). By 32 weeks’ postconceptual age, the GM is found only along the ventricular surface of the caudate nucleus and at its border with the thalamus.

It normally involutes by 34 to 36 weeks’ (4,5) postconceptual age. Nonhemorrhagic cerebral infarction, ventriculomegaly or cystic lesions, such as periventricular leukomalacia or porencephaly, may evolve from white matter injuries (7,8). Ventriculomegaly that occurs in the absence of IVH is most often secondary to the loss of cerebral white matter that has been damaged or failed to develop normally (9,10,11, and 12). This study the role of anterior fontanel ultrasonography as a valuable method for early detection of the common intracranial problems expected in preterm infants.

Patients and Methods
A cross sectional study conducted in the Neonatal Intensive Care Unit in Tikrit Teaching Hospital from the 1st of February 2008 to the end of May 2008, ninety preterm infants between 28 – 36 weeks of age had been admitted to NICU were included in this study, their body weights were ranged from 800 – 2300g, forty seven were males and forty three were females.

A special questionnaire forma has been prepared and this questionnaire items include the followings (age, sex, residency, type of delivery, maternal age, maternal health condition, prenatal care, obstetric history, socioeconomic status). Every preterm infant was examined for body weight, gestational age assessment according to New Ballard Score and clinical assessment. All the sample cases were sent to cranial ultrasound examination through the anterior fontanel within the first 3-5 days of
age by using the machine Siemens-Versa Pro and the Probe used is 7.5 MHz.

**RESULTS**

Table (1) had shown that 47 (52.23%) preterms of the sample were males and 43 (47.77%) preterm were females. The frequency distribution of gestational age (weeks) in table (2) had shown that 16 (17.78%) their gestational age was ranged from 28 – 30 weeks, 21 (23.34%) preterm from 31– 33 weeks and 53 (58.88%) preterm from 34 – 36 weeks.

As it was shown in table (3) the body weight (grams) distribution was 27 (30%) preterm their body weights was ranged from 800 – 1300g, 19(21.11%) preterms from 1300 – 1800g and 44 (48.89%) from 1800 – 2300g.

Table (4) had shown that 27 (30%) preterms had intracranial findings detected by anterior fontanel ultrasonography.

The distribution of intracranial findings as 2 (7.40%) preterms had Germinal matrix hemorrhage, 14 (51.86%) had intraventricular hemorrhage, 3 (11.11%) had periventricular leukomalacia and 8 (29.63%) had ventriculomegaly.

The frequency distribution of intracranial findings in relation to gender in table (1) had shown that 15 (31.91%) males and 12 (27.91%) females had intracranial findings.

The frequency distribution of intracranial findings in relation to gestational age in table (2) had shown that 12 (75%) preterms of gestational ages 28 – 30 weeks, 10 (47.61%) preterms of gestational ages 31 – 33 weeks and 5 (9.44%) preterms of gestational ages 34 – 36 weeks had intracranial findings.

The frequency distribution of intracranial findings according to body weight (grams) in table (3) had shown that 13 (48.14%) preterms of body weights 800 – 1300 g, 9 (47.37%) preterms of body weights 1300 – 1800 g and 5 (11.37%) preterms of body weights 1800 – 2300 g had intracranial findings.

Table (4) show the case – fatality rate in relation to intracranial findings, the case fatality rate for preterms with intracranial findings was (40.75%).

**DISCUSSION**

The result of this study shows that there is no relation between the gender and the frequency of intracranial problems, and this in agreement with results of Hessol N A study (12) which has showed that preterm infants are at increased risk of dying of complications of prematurity, their survival is directly related to birth weight and has no relation to gender. This study shows that there is significant association between the frequency of intracranial problems in preterm infants and the gestational age. This finding was in concordance with the results of Batton DG and Harding D studies, which are showed that because preterm infants, especially those younger than 32 weeks gestation, are prone to both germinal matrix and /or intraventricular hemorrhage and ischemic white matter injuries, routine cranial u/s examinations are most valuable for this age group and the maximum risk of germinal matrix hemorrhage GMH and /or intraventricular hemorrhage IVH is in infants born before 30 weeks gestation, the incidence of IVH is less then 5% after that time, however, because occasional abnormalities are detected in infants born after 30 weeks gestation, it seems prudent to perform routine cranial u/s on infants born at or before 32 weeks gestation(13-19).

This study indicates that there is significant association between the intracranial findings in preterm's and the body weight, where 13(48.14%) of body weight between 800-1300 gm and 9(47.37%) of body weight between 1300-1800 gm had intracranial finding ,this finding was consistent with Alexander GR and Garite TJ studies (15-22) which showed that the risk of intracranial problems is inversely related to gestational age and body weight with the smallest and most immature infants begin at the highest risk.

In LBW infants 5% of infants 1,250 – 1,500g will have a severe IVH (grade III or IV) compared to 11.4% of infants less than 1,000g birth weight. 60 – 70% of infants 500 – 750g will develop an IVH. The overall incidence for severe cranial u/s abnormalities (IVH, periventricular leukomalacia PVL) among preterm infants less than 1,000g is
22%, the incidence of PVL has increased from 2% to 7% over a 15 years period.

This study shows that the case fatality rate of preterm infants with intracranial problems was 40.75% this is nearly similar to that found in Sumits T, etal , which showed that LBW rate is an accurate predictor of the infant mortality rate. VLBW infants account for over 50% of neonatal deaths and 50% of handicapped infants, their survival is directly related to birth weight, with approximately 20% of those between 500 and 600g and over 90% of those between 1,250 and 1,500g surviving. VLBW infants is at increased risk of dying of complications of prematurity such as intracranial injury (hemorrhagic or ischemic), Bronchopulmonary dysplasia, necrotizing enterocolitis or nosocomial infection (17,19,22-28).

Conclusions

Anterior fontanel ultrasonography is a valuable method for early detection of the common intracranial problems expected in preterm infants and to provide informations about perinatal brain injury.

The frequency of intracranial findings detected by cranial ultrasound is higher in preterms with low gestational age (weeks) particularly below 33 weeks.

The frequency of intracranial findings detected by cranial ultrasound is higher in preterms with low body weight (grams) particularly below 1800g.

Case fatality rate among preterm infants with intracranial problems was (40.75%).

References

Table (1): Frequency Distribution of Intracranial Findings According to Gender.

<table>
<thead>
<tr>
<th>Intracranial findings</th>
<th>Male</th>
<th></th>
<th></th>
<th>Female</th>
<th></th>
<th></th>
<th>Total</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>No.</td>
<td>%</td>
<td>No.</td>
<td>%</td>
<td>No.</td>
<td>%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Present</td>
<td>15</td>
<td>31.91</td>
<td>12</td>
<td>27.91</td>
<td>27</td>
<td>30.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Absent</td>
<td>32</td>
<td>68.09</td>
<td>31</td>
<td>72.09</td>
<td>63</td>
<td>70.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>47</td>
<td>43</td>
<td>90</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Chi – square = 0.169, Degree of freedom = 1, p – value at 0.05 = 3.841 Not significant.

Table (2): Frequency Distribution of Intracranial Findings According to Gestational Age (weeks).

<table>
<thead>
<tr>
<th>Gestational age (weeks)</th>
<th>28 – 30</th>
<th>31 – 33</th>
<th>34 – 36</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>No.</td>
<td>%</td>
<td>No.</td>
<td>%</td>
<td>No.</td>
</tr>
<tr>
<td>Present</td>
<td>12</td>
<td>75.0</td>
<td>10</td>
<td>47.61</td>
</tr>
<tr>
<td>Absent</td>
<td>4</td>
<td>25.0</td>
<td>11</td>
<td>52.38</td>
</tr>
<tr>
<td>Total</td>
<td>16</td>
<td>21</td>
<td>53</td>
<td>90</td>
</tr>
</tbody>
</table>

Chi – square = 29.206, Degree of freedom =2, p – value at 0.05 = 5.991 Significant.
Table (3): Frequency Distribution of Intracranial Findings According to Body Weight (grams).

<table>
<thead>
<tr>
<th>Body weight (grams)</th>
<th>800 – 1300</th>
<th>1300 – 1800</th>
<th>1800 – 2300</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intracranial findings</td>
<td>No.</td>
<td>%</td>
<td>No.</td>
<td>%</td>
</tr>
<tr>
<td>Present</td>
<td>13</td>
<td>48.14</td>
<td>9</td>
<td>47.37</td>
</tr>
<tr>
<td>Absent</td>
<td>14</td>
<td>51.86</td>
<td>10</td>
<td>52.63</td>
</tr>
<tr>
<td>Total</td>
<td>27</td>
<td>19%</td>
<td>44</td>
<td>44%</td>
</tr>
</tbody>
</table>

Chi – square = 14.238, Degree of freedom =2, p – value at 0.05 = 5.991 Significant.

Table (4): Case – Fatality Rate Distribution in Relation to Intracranial Findings.

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Died</th>
<th>Alive</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No.</td>
<td>%</td>
<td>No.</td>
</tr>
<tr>
<td>Intracranial finding</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Present</td>
<td>11</td>
<td>40.75</td>
<td>16</td>
</tr>
<tr>
<td>Absent</td>
<td>17</td>
<td>26.99</td>
<td>46</td>
</tr>
<tr>
<td>Total</td>
<td>28</td>
<td>62%</td>
<td>62</td>
</tr>
</tbody>
</table>

Chi – square = 1.666, Degree of freedom =1, p – value at 0.05 = 3.841 Not significant.