Impact of training on practical skills of Iraqi health providers towards integrated management of neonatal and childhood illness - a multi-center cross sectional study

Mustafa Ali Mustafa Al-samarrai 1, Saad Ahmed Ali Jadoo 2*

Abstract
Background: This study aims to assess the mandatory practical skills of caregivers towards implementation of the Integrated Management of Neonatal and Childhood Illness (IMNCI) strategy in primary health care (PHC) centers of Salah al-Din governorate in Iraq.

Methods: A cross-sectional comparative study was conducted from January to May 2014. An equal sample of 42 trained and 42 non-trained caregivers who are working in 20 PHC centers in Tikrit city and other districts of Salah al-Din governorate of Iraq were included. The study tool was semi-structured questionnaire with 20 questions covering different required practical skills that caregivers should have. The total score was 100 and in a range of 4-6 points for each question. An independent sample t-test was used to compare means of numerical variables.

Results: The mean age of total respondents was (33.18 SD 5.82Years) and the vast majority 63 (75%) were females. More than two third 58(69.0%) were paramedical compared to 26 (31.0%) who were doctors. Trained caregivers had statistically significant better practice (73.48 SD 13.46) compared to non-trained caregivers (63.95 SD 17.44). Trained doctors had statistically significant better practice (88.15 ± 2.70) compared to trained paramedical staff (66.90 ± 10.84). Trained caregivers from Tikrit city had statistically significantly better practice (80.26 SD 7.38) compared to trained caregivers from districts (67.89SD 14.85). The highest proportion (97.5%) of trained caregivers felt the child for fever or body hotness properly and the lowest proportion (59.5%) of them recorded age, height and weight correctly.

Conclusion: This study showed that training has a positive influence on the implementation of IMNCI interventions. IMNCI-trained caregivers were more likely to correctly classify illnesses than non-trained caregivers.

Keywords: IMNCH, healthcare provider, practice, Tikrit, Iraq

Background
Since its first issue during the 90s of the last century, Integrated Management of Neonatal and Childhood Illness (IMNCI) strategy focused on illnesses that cause the majority of deaths in children under-5 years, many of which are preventable or readily treatable using simple interventions; these are pneumonia, diarrhea, meningitis, malaria, malnutrition, anemia and HIV/ AIDS [1,2]. All IMNCI-trained caregivers should receive at least one follow-up visit in their own health facility after training, to reinforce their skills and solve implementation problems [3]. Children (under-5 years) examined by IMNCI-trained caregivers were much more likely to get the right treatments [4]. Although medical consultation at IMNCI center takes longer time, it has proved to be more efficient [5] and cost less than routine health care in some other centers [6]. An evaluation carried out in 5 countries [7] showed improvements in IMNCI-trained caregivers performance following IMNCI training [8,9], however the IMNCI performance among the worldwide caregivers were often poor. In underdeveloped countries such as Uganda [10] and Peru [11] only 50% and 10% of children received correct treatment respectively. Nevertheless, there is a wide field to improve in some of most successful IMNCI implementation places [12].

Since 1998, IMNCI strategy was introduced to Iraq; however, the progress of this strategy received no more attention whether from the local or international researcher. The preparation period (1998-2004) for IMNCI implementation was poor and fluctuated up to the second half of 2004. The beginning of year 2005 considered the real date signing the launch of the program, where the Ministry of Health (MOH), in
collaboration with World Health Organization (WHO) reactivated the process jointly with United States Agency for International Development (USAID) project to scale up IMNCI-training as part of the work to support the newly constructed PHC centers with health professionals [13,14]. The expansion phase in between of 2006 and 2012 indicated the progress of IMNCI implementation in Iraq. Several of Iraqi doctors were engaged in 11 days training program. The number of provinces implemented the program has been doubled by three times from 2006 to 2012 and the number of districts has increased from just 4 to 90 districts. Meanwhile, the percent of health facilities implemented the IMNCI program grew from 0.9% to 77.3% and the number of IMNCI-trained caregivers increased from 189 in 2006 to over 5268 in 2012. The number of new IMNCI-training courses has increased from 5 in 2006 to 90 in 2012 [13,15]. However, very few have been done to assess this program. Tawfiq (2009) in his study compared the quality of care at 6 health centers providing IMNCI activity in Baghdad city with other 6 non IMNCI health facilities. Among other important findings reported by this study, “Large proportions of conditions incorrectly classified by the provider were under-classified as milder cases in non IMNCI centers, the reasons included inaccurate history, incomplete or incorrect assessment, not taking assessment findings into account, or giving no classification at all “ [16]. Yasin et al. (2014) found that knowledge of forty two caregivers who had attended at least one 7-days IMNCI- training course, with experience of more than six months in IMNCI units was statistically significantly higher than their counterpart [15]. Recently, Abdullah andBahir (2017) indicated that the knowledge was fair and performance was poor among fifty one IMNCI-trained caregivers selected from two PHC centers in Baquba city, Iraq [17]. Therefore, it was necessary to practically evaluate how the Iraqi caregivers implement the guidelines of IMNCI and their experiences in follow up outpatient visits. This study aimed to assess the difference in practice of IMNCI between (IMNCI-trained and non-trained caregivers), (IMNCI-trained physicians and paramedical staffs) and between IMNCI-trained caregivers from Tikrit PHC centers and those from districts PHC centers. Manuscripts with many symbols should have a nomenclature which conforms to the system of standard international (SI) understood by the general reader.

Methods
This study was secondary analysis of large study [15] conducted in health facilities in Salah al-Din governorate of Iraq from January to May 2014. Salah al-Din governorate is located in Northeast and was among the several regions in Iraq that has launched the IMNCI strategy in PHC centers. As per Salah al-Din governorate health department statistics (January 2014), there are 33 operational PHC centers offering multiple health services including the under-five curative services.

Briefly, a cross-sectional comparative study was designed to collect (total sampling technique) the data from all central and district PHC centers that having a working unit of IMNCI within the Salah al-Din governorate. A list of the caregivers was obtained from each included PHC center and they were contacted personally by the researcher team. The eligible respondents were both genders of whatever age. Inclusion and exclusion criteria are listed in Table 1. Due to exclusion criteria twenty PHC centers have been included (7 from Tikrit city and 13 from district regions). Thirteen centers were excluded as 8 centers didn’t have working IMNCI unit and 5 centers have no actively IMNCI-trained caregivers. Two of caregivers were not willing to participate and one more was absent in day of data collection. The final study population consisted of 84 participations (42 IMNCI-trained and 42 non-trained). understood by the general reader.

<table>
<thead>
<tr>
<th>No.</th>
<th>Inclusion and Exclusion Criteria</th>
<th>IMNCI-Trained</th>
<th>Non-trained</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>PHC centers that having a working unit of IMNCI</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>2.</td>
<td>Doctors</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>3.</td>
<td>Paramedical caregivers</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>4.</td>
<td>Willing to participate</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>5.</td>
<td>Caregivers of the Maternal &amp; Child Care Unit (MCU)</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>6.</td>
<td>Actively engaged in IMNCI program for more than 6 months</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>7.</td>
<td>Participated in one 7-days IMNCI-training course as a minimum</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>8.</td>
<td>Chief medical officer (CMO)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>9.</td>
<td>Deputy CMO</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>10.</td>
<td>Hospital manager</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>11.</td>
<td>Deputy hospital manager</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

(+): Inclusion criteria, (-): Exclusion criteria

Study instrument
The available scientific literature including the guidelines and training materials distributed by Iraqi MOH were reviewed to design a semi-structured questionnaire. The scale included 20 items covering different required practical skills that caregiver should have. Components of practical assessment have been selected and approved by a scientific committee composed of four qualified and expert professionals (pediatric specialist, community medicine specialist, maternal and child health nursing specialist, primary healthcare specialist). The English version was translated into Arabic language by a linguistic and academic expert committee. The scoring of the questions in practical assessment was ranging from 4-6 marks according to importance with a final total score of 100 points.

Pilot Study
In first pilot study, 5 physicians and 5 paramedical were randomly selected and separately asked to exam 2 different cases thoroughly and record all negative and positive findings apart by 10-15 minutes for each. The cases were the daily outpatient visitors (children under-5 years) of the PHC. According to the symptoms described by their mothers, children have been categorized into four groups; breathing difficulties, diarrhea, fever, and feeding difficulties. Findings showed that under close observation but without researcher interference, most of caregivers (2 physicians and 4 paramedical) were confused and unable to cover all elements in less than 15 minutes. A second pilot study was implemented on another 10 caregivers with similar criteria, but in different center. In this
time, two statements have been refined and the caregivers were observed at a distance and left free to receive the mother with her child, take history, do general examination and record information in a classical child card. Findings were more satisfactory and most of caregivers were able to practice the full examination within average time of 15-20 minutes. The scientific committee approved the items, marks and time and considered the questionnaire for this study.

Statistical analysis
The Statistical Package for Social Sciences (SPSS Inc., Chicago IL, USA) [18] was used for data entry and analysis. Data were presented in mean and standard deviation. Normality test (Kolmogorov-Smirnov) was run and all the quantitative data were found to be normally distributed. Inspection of Q-Q Plots revealed that practice was normally distributed for both groups and that there was homogeneity of variance as assessed by Levene’s Test for Equality of Variance. Therefore, bivariate analyses such as an independent t-test were run on the data to compare means of numerical variables, as well as 95% confidence interval (CI) for mean difference. An alpha level of \( p < 0.05 \) is considered to be statistically significant. The practice questionnaire was statistically reliable (Cronbach’s \( \alpha \) coefficient was 0.964) indicated excellent degree of homogeneity among the scale items. Validity statistic test was found to be inconvenient because there were no unique study collecting all standard elements of practice to compare with.

Results and Discussion

Descriptive analyses
The total participants were 84 caregivers (42 IMNCI-trained and 42 non-trained). The average age of participants was 33.18 (SD 5.82) years of which 63(75%) were females and 58(69.0%) were paramedical staffs.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Total sample</th>
<th>IMNCI-Trained</th>
<th>Non-trained</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (mean ± SD)</td>
<td>33.18 ± 5.82</td>
<td>34.36 ± 6.07</td>
<td>32.09 ± 5.41</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>21(25.0%)</td>
<td>9(21.4%)</td>
<td>12(28.6%)</td>
</tr>
<tr>
<td>Female</td>
<td>63(75%)</td>
<td>33(78.6%)</td>
<td>30(71.4%)</td>
</tr>
<tr>
<td>Occupation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Doctors</td>
<td>26(31.0%)</td>
<td>13(31.0%)</td>
<td>13(31.0%)</td>
</tr>
<tr>
<td>Paramedical</td>
<td>58(69.0%)</td>
<td>29(69.0%)</td>
<td>29(69.0%)</td>
</tr>
</tbody>
</table>

Practice scores
The criteria of examination were compatible with those discussed in second pilot study. The lowest scoring was labeled 4 marks and the highest scoring was 6 marks to each item in relation to importance. Score of each caregiver was registered by researcher in terms of skills and speed. Caregivers had mean practice score of 68.71(SD11.62) with minimum score of 92 and the maximum score of 33. The highest proportion (97.5%) of IMNCI-trained caregivers felt the child for fever or body hotness properly and the lowest proportion (59.5%) of them recorded age, height and weight correctly.

The vast majority (80.25%- 85.2%) of them took proper position of child during examination, took child’s temperature by thermometer, counted respiration (breaths) for 60 seconds, checked skin turgor for dehydration, and asked about normal feeding habits when the child is not ill. More than seventy percent (70.0%- 79.75%) of them checked for pallor by looking at palms and lips, checked for enlarged lymph nodes in front of the neck, pressed both feet to check for edema, asked about normal breastfeeding habits when child is not ill, asked about feeding or breastfeeding habits or practices for child during this illness, and mentioned the child’s weight or growth to the caretaker, or discussed growth chart. About two third (61.5% - 68.43%) of them looked in child’s ear and behind it if there is ear problem, undressed child to examine (from shoulders to ankles), offered the child water to drink if she/he has diarrhea, asked about the child’s immunization card and history, administration of oral rehydration therapy (ORT and ORS) , wrote on the child’s recording form and asked about general danger signs such as: child is unable to drink or breastfeed; child vomits everything; child has had convulsions with this illness.

Table 2 Frequency distribution of socio demographic respondents (n=84)

Table 3 Illustrates optimal score for each item, mean results with standard deviation and percentage of performance

<table>
<thead>
<tr>
<th>No.</th>
<th>Practice statements</th>
<th>Mean</th>
<th>SD</th>
<th>Scores</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Took proper position of child during examination</td>
<td>4.14</td>
<td>0.75</td>
<td>5</td>
<td>82.80</td>
</tr>
<tr>
<td>2</td>
<td>Took child’s temperature by thermometer</td>
<td>4.19</td>
<td>1.04</td>
<td>5</td>
<td>83.80</td>
</tr>
<tr>
<td>3</td>
<td>Felt the child for fever or body hotness</td>
<td>3.90</td>
<td>0.37</td>
<td>4</td>
<td>97.50</td>
</tr>
<tr>
<td>4</td>
<td>Counted respiration (breaths) for 60 seconds</td>
<td>4.02</td>
<td>1.07</td>
<td>5</td>
<td>80.40</td>
</tr>
<tr>
<td>5</td>
<td>Checked skin turgor for dehydration</td>
<td>4.26</td>
<td>0.77</td>
<td>5</td>
<td>85.20</td>
</tr>
<tr>
<td>6</td>
<td>Checked for pallor by looking at palms and lips</td>
<td>3.95</td>
<td>0.94</td>
<td>5</td>
<td>79.00</td>
</tr>
<tr>
<td>7</td>
<td>Recorded age, height and weight correctly.</td>
<td>3.57</td>
<td>0.86</td>
<td>6</td>
<td>59.50</td>
</tr>
<tr>
<td>8</td>
<td>Looked in child’s ear &amp; behind it if there is ear problem</td>
<td>3.69</td>
<td>1.22</td>
<td>6</td>
<td>61.50</td>
</tr>
<tr>
<td>9</td>
<td>Undressed child to examine (from shoulders to ankles)</td>
<td>3.40</td>
<td>0.83</td>
<td>5</td>
<td>68.00</td>
</tr>
<tr>
<td>10</td>
<td>Pressed both feet to check for edema</td>
<td>3.50</td>
<td>1.08</td>
<td>5</td>
<td>70.00</td>
</tr>
<tr>
<td>11</td>
<td>Checked for enlarged lymph nodes in front of the neck</td>
<td>3.14</td>
<td>0.75</td>
<td>4</td>
<td>78.50</td>
</tr>
<tr>
<td>12</td>
<td>Offered the child water to drink if she/he has diarrhea</td>
<td>3.35</td>
<td>0.65</td>
<td>5</td>
<td>67.00</td>
</tr>
<tr>
<td>13</td>
<td>Asked about normal breastfeeding habits when the child is not ill</td>
<td>3.21</td>
<td>0.52</td>
<td>4</td>
<td>80.25</td>
</tr>
<tr>
<td>14</td>
<td>asked about normal breastfeeding habits</td>
<td>2.97</td>
<td>0.46</td>
<td>4</td>
<td>74.25</td>
</tr>
</tbody>
</table>
when child is not ill
15  Asked about feeding or breastfeeding habits or practices for child during this illness 3.19 0.63 4 79.75
16  Mentioned the child's weight or growth to the caretaker, or discussed growth chart 2.95 0.62 4 73.75
17  Asked about the child's immunization card and history 3.86 0.98 6 64.33
18  Administration of ORT & ORS. 4.09 1.30 6 68.17
19  Wrote on the child's recording form. 3.26 0.77 5 65.20
20  Asked about general danger sign: 4.79 1.16 7 68.43

**Bivariate analysis**

An independent-sample t-test was run to determine if there were differences in practice scores between IMNCI-trained and non-trained, IMNCI-trained medical and paramedical staff, and between IMNCI-trained from Tikrit city and trained from the district regions (Table 4).

<table>
<thead>
<tr>
<th>Variables</th>
<th>Trained (n=42)</th>
<th>Non-trained (n=42)</th>
<th>df, test, t</th>
<th>p-value</th>
<th>95%CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total IMNCI-trained and non-trained</td>
<td>73.48 ± 63.95</td>
<td>69.52 ± 64.35</td>
<td>t (82) = 2.76</td>
<td>0.004</td>
<td>5.36 to 5.74</td>
</tr>
<tr>
<td>IMNCI-trained</td>
<td>88.15 ± 66.90</td>
<td>73.46 ± 67.89</td>
<td>t (40) = 3.26</td>
<td>0.000</td>
<td>6.25 to 8.42</td>
</tr>
<tr>
<td>TM-trained (medical and paramedical)</td>
<td>7.20 ± 10.84</td>
<td>6.93 ± 11.62</td>
<td>t (40) = 1.16</td>
<td>0.250</td>
<td>-1.43 to 7.23</td>
</tr>
</tbody>
</table>

**Table 4** Descriptive statistics between total trained and non-trained, trained medical and paramedical, trained from Tikrit and other Districts

**Total IMNCI-trained and non-trained**

IMNCI-trained caregivers had statistically significantly better practice (73.48 ± 13.46) compared to non-trained caregivers (63.95 ± 17.44) (t (82) = 2.802, p = 0.024), with a difference of 9.524 (95% CI, 2.76 to 16.29). In fact, these findings were not surprising and were concurrent with other findings from Morocco, showed that IMNCI-trained PHC nurses provided better quality care to under-fives compared to those who had not been trained [19]. Chopra et al. (2005) in his study in South Africa found that the performance of caregivers to assess the general danger signs in sick children showed a marked improvement from just 7% before IMNCI-training to 72% after training [20]. Adekanye et al. (2014) found that the majority of Nigerian nurses had acquired knowledge and became aware of the IMNCI strategy during their training and clinical practice in child health care centers [21]. Nguyen et al (2013) in his systematic review and meta-analysis study concluded that IMNCI-trained caregivers were more likely to correctly classify illnesses [22]. Furthermore, Chitembo (2012) indicated that the majority of IMNCI-trained caregivers were able to assess the sick children correctly and communicate to their caretakers satisfactorily [23]. Moreover, findings from Brazil revealed that the caregivers who had received IMNCI-training were significantly more likely to classify a child correctly than those who had not received IMNCI-training, with an adjusted prevalence ratio of 2 (95% CI: 1.6-2.4; p < 0.001) [24].

**IMNCI-trained medical and paramedical staff**

IMNCI-trained medical staff (doctors) had statistically significantly better practice (88.15 ± 2.70) compared to IMNCI-trained nurses or paramedical staff (66.90 ± 10.84) (t (40) = 6.932, p = 0.000), with a difference of 21.257 (95% CI, 15.10 to 27.46). Usually, the post graduated medical doctors in Iraq are expected to have high knowledge and better practice because they already had undergone a focus training courses during their study and in their hospital services compared to their counterparts (nurses). Similarly, Nigerian study in 2014, found that lack or insufficient professional aids such as wall charts and chart booklets have encouraged nurses to improvise materials and consequently reflect negatively on IMNCI implementation [21]. Also these nurses found a difficulty in implementing the IMNCI guidelines because they need longer time and as such would increase the average time for assessing, managing/treating children [21]. However, Tanzanian study done in 2004 reported that IMNCI-trained nurses had better performance than IMNCI-trained medical officers [25]. Furthermore, study conducted in 2008 in Kenya revealed that nurses generally expressed positive attitudes about IMNCI, while some clinical officers and doctors have not accepted the IMNCI approach. They feel that the guidelines are simplistic and do not allow them to make full use of their clinical training [26].

**IMNCI-trained caregivers from Tikrit city and districts**

IMNCI-trained caregivers from Tikrit city had statistically significantly better practice (80.26 ± 7.38) compared to IMNCI-trained caregivers from districts (67.89 ± 14.85) (t (40) = 3.310, p = 0.011), with a difference of 12.39 (95% CI, 4.83 to 19.96). In fact, IMNCI-trained caregivers who are working in PHC centers in Tikrit city had received more IMNCI-training programs, especially those carried out under direct supervision of USIAD; the main trainer. This partly could explain the higher skill of knowledge [15] and practice of IMNCI-trained caregivers from Tikrit city compared to their counterparts in other districts. Similarly, findings from Senegal [27] showed that the IMNCI-training had improved the caregivers’ knowledge and skill in managing pediatric patients, and increased their opportunities to utilize the IMNCI-strategy guidelines. However, this study found that only 16% of caregivers who are working in districts used the IMNCI approach on a regular basis. This low rate of compliance is due to the inefficiency of IMNCI procedures and the inability of caregivers to apply treatment protocols, appointment planning or emergency situations [27]. World Health Organization (2008) indicated that “Follow-up is an essential component to
reinforce skills acquired during training and to help solve problems encountered during the implementation of the IMNCI strategy” [71].

There are some limitations to this study. Although the researcher included all population in his research, however the sample of caregivers included in IMNCI was relatively small, so an analytic study couldn’t be performed and the study was limited to a descriptive one. This study is also limited by the time, logistic barriers and the security situation in Iraq, which made PHC centers inaccessible and difficult to cover a huge province such as Salah al-Din. Further, response bias is a possible bias, because of direct observing of candidates during assessment may increase their attention and ultimately stimulate them for maximum efforts so the results was higher than expected. Finally, the scores were scaled and considered by a committee of a pediatrician and a PHC specialist as there was no previous study, so it could be not so reliable.

**Policy implication**

Results of current study might have revealed the positive effect of training on IMNCI implementation; however a lot of points have to be considered to improve the performance such as considering the training material of IMNCI in all of Iraqi medical and nursing schools and to expand the level of the maternal and child care unit (MCU) in the governorates to the level of department to cope with its numerous programs. Further studies are encouraged with specific concentration on recent advances like e-IMNCI; administering IMNCI protocol into mobile for faster, cheaper and easier implementation.

At the level of directorate of health, important actions have to be taken such as increasing the supportive supervision and periodic training courses to IMNCI-trained caregivers especially at the districts level and to encourage HPs working in MCU by adding bonus on their salary and protecting them from leaving their unit. It is recommended to improve the recording and mother instructions skills among caregivers and giving more attention to establish an independent statistics unit with active referral system and feedback nutrition at level of PHC centers, general hospitals and directors. Finally, national programs to encourage health education and community sharing about IMNCI role as a therapeutic and protective measure (e.g. home care of sick child, accidents of children, vaccination and nutrition of children and so forth).

**Conclusion**

Discrepancies were evident among trained and non-trained caregivers towards important aspects in IMNCI implementation; indicating the skill gap. Trends toward greater training benefits were also observed among the trained caregivers from different geographical regions. The trained caregivers who are working in districts PHC centers have less opportunity to utilize the IMNCI strategy guidelines, because the training courses advocated by USAID (United States Agency for International Development) were strictly confined to Tikrit city.

**Abbreviations**

IMNCI: Integration Management of Neonatal and Childhood Illness; PHC: Primary Health Care MOH: Ministry of Health; USAID: United States Agency for International Development; WHO: World Health Organization MCU: Maternal and Child Care Unit; ORT/ORS: Oral Rehydration Therapy CI: Confidence Interval; CMO: Chief Medical Officer SD: Standard Deviation

**Declarations**

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**Availability of data and materials**

Data will be available by emailing ma_m776@yahoo.com

**Authors’ contributions**

MAM is the principal investigator of the study who designed the study and coordinated all aspects of the research including all steps of the manuscript preparation. He is responsible for the study concept, design, writing, reviewing, editing and approving the manuscript in its final form. SAAJ contributed in the study design, analysis and interpretation of data, drafting the work, writing the manuscript and reviewed and approved the manuscript. All authors read and approved the final manuscript.

**Ethics approval and consent to participate**

We conducted the research following the Declaration of Helsinki, and the protocol was approved by the Ethic Committee of the Postgraduate Studies Unit (PSU), College of Medicine, University of Tikrit (Ref: 3/7/813 at 17-December -2013). Moreover, written informed consent was obtained from each caregiver and oral consent from each mother willing to participate after explanation of the study objectives and guarantee of secrecy.

**Consent for publication**

Not applicable

**Competing interest**

The authors declare that they have no competing interests.

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