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Awareness and Knowledge of Osteopenia of Prematurity Among Pediatricians in Iraq: A Cross-Sectional Survey

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Abstract

Introduction and Objectives: Osteopenia in premature infants is a preposterous disease, early born preterm infants especially suffers from it. It can lead to fractures and lead them growing out of proportion. The object of this study is to investigate the awareness of pediatricians, how much they know about OOP and what their practice patterns are in Iraq. A cross-sectional study was carried out among healthcare professionals in different parts of Iraq between July 2024 and March 2025. We distributed an online questionnaire using electronic mail to 127 pediatric health care providers. As well as demographics, the questionnaire included items concerning OOP awareness, knowledge, and treatment. Data was processed through SPSS v.26, and chi-square was used to measure whether level of experience significantly differed ($p < 0.05$)

Methods: A cross-sectional study was carried out among healthcare professionals in different parts of Iraq between July 2024 and March 2025. We distributed an online questionnaire using electronic mail to 127 pediatric health care providers. As well as demographics, the questionnaire included items concerning OOP awareness, knowledge, and treatment. Data was processed through SPSS v.26, and chi-square was used to measure whether level of experience significantly differed ($p < 0.05$)

Results: the majority of participants, 55.9% were male; 35-45 years of age accounted for the greatest proportion, at 44.0%. It is a common practice in the Al Sulaymaniyah Region. The response rate was 91.1% on Closed data; it ranged from 60% (of urban residents) to 82.4%. When asked about house types and living conditions, more than 90% did not differentiate between their own house and that of their relatives, which made it difficult to distinguish rural from city dwellers. The percentage of respondents surveyed who had heard of OOP was highest in other rural areas (43.8%). In the rest, 94.0% already knew about OOP. Beyond blood pressure management, the standard of prevention and control was very low. Human resource capacity is the most obvious bottleneck in the development of chronic disease prevention and control. In many cities, there is no one who knows these things: either too many people are engaged or too few have any knowledge. The disease management model was unbalanced both scientifically and technologically. This problem was so serious that if it were not resolved, it became inevitable that chronic diseases, especially those which had only developed in the last ten years. The most favourable options for correct treatment are Ca and phosphate supplements.

Conclusions: There are substantial gaps in OOP screening and knowledge among Iraqi pediatricians despite the high prevalence of preterm neonates observed. National guidelines should be standardized, and better training and continuing medical education for the early recognition and management is required.

Background: Osteopenia of prematurity is a type of metabolic bone disease that could be prevented with an appropriate early intervention, and in preterm infants, the lack of physician awareness may contribute to undesirable consequence.

Keywords: Pediatrician; Osteopnia; Prematurity; Awareness

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Introduction

The development of a healthy skeleton begins in infancy. Intrauterine mineralization is disturbed in preterm infants and as a result they are at high risk for metabolic bone disorders. Osteopenia of prematurity (OOP) is a frequently encountered problem, occurring in as many as 55% of very low birth weight infants. This becomes an issue particularly since preterm infants are deprived of the essential last trimester and depend on postnatal nourishment to achieve development. In the absence of early diagnosis and treatment, this disease can result in fractures, rickets, growth retardation and increased risk to osteoporosis in the adult life [8-12]. So, identify and manage quickly!

While the whole world is increasingly conscious of OOP, the techniques and standards employed by every area in checking, preventing Patients' lives strikes a different chord of the final note wherever they may be. Steel comes chiefly from Western Europe, but even there the St. Hubert ICD yield is only 41% in an average year. It is characterised by low voice in Iron and Steel Policy, which sets the tone for fluctuating practices and never generates stable output--no matter how much steel Little Iron is now supplying "from its home on the Sabbath day, through its well-stocked water cooler". These income disparities give rise to some serious questions regarding both the efficacy of neonatal care (so how is a mother in rural India to know she can safely entrust her newborn baby with an attendant) and its human cost. And it is in many of these same LMICs, such as Nepal, whose rank growth has just begun but whose resource allocation within the higher education system was constrained by external forcing.

That some such divide is present is worrying not only because certain regions will never be able to afford neonatal care but also as those provinces within a country poor in natural resources.

In Iraq, the years of war. and economic problems have reduced access quality of newborn serminces. These factors might create a barrier for clinicians to be familiar with neonatal bone health norms, which in turn could influence their education in medicine and ongoing experience. What actually helps is not well defined as preterm birth occurs at a high rate at a children's age in Iraq, and it is still uncertain how effectively Iraqi pediatricians are able to identify, screen for and manage OOP. The results of previous studies have suggested that both clinical experience and the availability of a guideline would affect physician knowledge, but there is regional variability in these drivers which warrants evaluation on a specific basis.

There is no specific published study globally about healthcare provision to out-patients in general or among pediatricians, also there is no available data about the awareness and practice related to OOP among pediatricians in Iraq. Determining existing knowledge gaps can help shape education programs and national guidelines.

The present study was designed to assess the awareness, knowledge, and management practices among Iraqi pediatricians of osteopenia of prematurity. Namely, it plans to evaluate: 1) awareness towards OOP; 2) perception on risk factors and prevention, screening, and treatment; as well as the impact of professional experience and where respondents practice their knowledge. The results can be used to direct OOP case finding and management in high-risk populations.

Materials and Methods

Study Design and Setting

This study is of observational descriptive cross-sectional kind and was conducted during the period July 2024 through March 2025 on multiple health care facilities located in various parts of Iraq. (Central part run by the general population/northern Cadaveric/Southern Solid organ transplant service) The main aim of this survey is to explore and assess paediatric healthcare providers expertise, sense of liability for care and clinical practice in the provision of OOP services to communities catering PN.2.2. Study Population and Sampling Strategy

The target population was pediatricians, residents, consultants, and family physicians interested in preterm care. This sample design reflected a non-random convenience sample due to logistical challenges in accessing and obtaining responses from a medical community scattered about various locations. The participants were recruited using professional network chains, hospital departments and virtual media (WhatsApp groups, e-mail lists) directed at pediatric associations and neonatal units.

We reached out to 320 senders on an email list and over the messaging gates. From this, 127 returned the full questionnaire which is a response rate of 39.7%. Licensed healthcare provider in Iraq, directly involved in the care of preterm infants, consented to participate. The exclusion criteria were any incomplete data collection and disengagement with neonatal care.

Sample Size Justification

This was a knowledge-assessment survey that was not powered formally. Nevertheless, the sample size of 127 is above the lowest for cross-sectional surveys with a confidence level of 95% (confidence interval 5%) and an expected proportion of 50%.

Data Collection Instrument

A structured, anonymous online survey was constructed for this purpose. It included three sections:

Demographics and professional characteristics: age, gender, specialty, years since graduation and location of practice.

Exploration of Providers' Knowledge, Attitudes and Beliefs Regarding OOP: Awareness assessment: exposure to preterm infants, recognition OOP as a clinical concern, screening practices

– Knowledge assessment: understanding of risk factors, etiology, prevalence, optimal timing for screening (if applicable) and management of OOP.

The questionnaire, that was used based on literature reviews and international guidelines. Content validity was evaluated by three neonatologists and a pediatric endocrinologist. A pilot test of ten pediatricians evaluated clarity, and the time needed for completion was registered to make minor adjustments.

The final scale consisted of 22 items comprising mostly multiple-choice and Likert questions. The survey was conducted using Google Forms in order to ensure that participants could respond anonymously and securely stored. Once the survey link was publicly available and could be shared digitally, two reminders were sent out to non-respondents to increase participation.

Ethical Considerations

Acknowledgements: The Institutional Review Board of [College of Medicine, University of Sulaymaniyah] approved the study. (Approval No:154) All respondents gave electronic informed consent before they took the survey. The study was voluntary, and respondents were promised that their confidentiality would be maintained and that their data would be used only for research purposes. No personally identifiable information, such as name or address, was collected.

Statistical Analysis

The data were then extracted from Google Forms and analyzed with the IBM SPSS Statistics version 26.0 software. Categorical variables were summarized as frequencies and percentages using descriptive statistics. Chi-square (χ^2) test was used to compare responses between different levels of experience (e.g. <5 years vs. >15 years). Statistical significance was defined as $p < 0.05$ [. To ensure accuracy, empirical responses were double-checked for all entries made and range checks helped in identifying extreme values or illogical responses.

Results

Table 1 presents the demographic and professional characteristics of the 127 pediatricians who participated in the study. Most respondents were male 71 (55.9%) and most were between 35 and 45 years of age 56 (44.0%). In terms of professional status, the largest group identified as pediatricians 87 (69.1%), followed by pediatric residents 39 (30.7%). Regarding experience, most participants reported working in the pediatric field for less than 10 years, with 37 (29.1%) having 5–10 years of experience and 35 (27.6%) having less than 5 years.

Table 2 illustrates the geographical distribution of the study participants across various cities in Iraq. The majority of respondents were based in Al Sulaymaniyah, accounting for 72 (56.7%) of the total sample, while smaller proportions were from Erbil 14 (11.0%), Baghdad 10 (7.9%), and Duhok 10 (7.9%). Other cities, such as Basrah and Ranya, contributed only a minor share of participants.

Table 3 presents the practices and perceptions regarding osteopenia of prematurity among pediatricians in Iraq, categorized by their duration of experience in the pediatric field. The majority of respondents across all experience groups reported seeing premature babies in their practice, with the highest proportion observed among those with 5–10 years of experience (97.3%), followed closely by those with over 15 years (95.5%), 10–15 years (93.9%), and less than 5 years (88.6%) (p=0.477). Most pediatricians in each group considered osteopenia a significant concern, with affirmative responses ranging from 50.0% to 67.6% (p=0.575). Screening for osteopenia was less commonly reported, with the highest frequency among those with 10–15 years (36.4%) and 5–10 years (35.1%) of experience, while only 14.3% of those with less than 5 years reported screening (p=0.128). Regarding prevention, a majority in each group believed osteopenia is preventable, particularly among those with more than 15 years of experience (81.8%), though a notable proportion in all groups indicated uncertainty (p=0.398). Most participants across all experience levels agreed that osteopenia is treatable, with affirmative responses exceeding 82% in each group (p=0.791).For the main cause of osteopenia, most pediatricians across all experience groups as being primarily responsible for osteopenia 14 (63.6%), with higher recognition rate among those with >15 years of experience 20 (90.9%) though this difference did not reach statistical significance (p=0.267). The most answered response across all groups regarding what percentage of infants develop osteopenia was "I do not know" (54.5% of the >15 years group, 37.8% of the 5–10 years group) but there was no statistical difference (p=0.361). There was a statistically significant difference (p = 0.035) among experience groups for the main risk factor, with prematurity being the main risk in similar proportions across groups: 18(51.4%) of <5 years, 20(54.1%) of 5-10 years, 18(54.5%) of 10-15 years, and 12(54.5%) >15 years' experience group respectively for screening timing and best treatment approaches, there were no statistical differences among experience groups (P = 0.936 and P = 0.359 respectively), with calcium + phosphate representing the top treatment option in all groups (Table 4).

Table 1: Demographic and Professional Characteristics of Participants (N = 127).

Variable		No.	%
Sex	female	56	44.1
	Male	71	55.9
Age	≤25	6	5.0
	25-35	40	31.0
	35-45	56	44.0
	> 45	25	20.0
Professional Title	Pediatric Resident	39	30.8
	Pediatrician	87	69.2
Duration in Pediatric Field	< 5 years	35	27.6
	5-10 years	37	29.1
	10-15 years	33	26.0
	> 15 years	22	17.3

Table 2: Geographical distribution of participants.

City	No.	%
Al Sulaymaniyah	72	56.7
Baghdad	10	7.9
Duhok	10	7.9
Erbil	14	11.0
Ranya	4	3.1
Kalar	2	1.6
Zakho	2	1.6
Basrah	5	3.9
Fallujah	1	0.8
Halabja	1	0.8
Kirkuk	1	0.8
Koya	1	0.8
Najaf	1	0.8
Qaladiza	1	0.8
Salahaldeen	1	0.8
Diwaniyah	1	0.8

Key Summary of Findings

- High exposure to preterm infants, but low screening rates (≤36.4%).
- Most believe OOP is preventable and treatable, but lack knowledge of prevalence.
- Prematurity is correctly identified as the main risk factor.
- Calcium + phosphate is the preferred treatment, but vitamin D use is underreported.
- No significant improvement in knowledge with experience, except for risk factor recognition.

Table 3: Practices and Perceptions of Osteopenia of Prematurity by Duration in Pediatric Field.

Variables	Category	<5 years (n=35)	5-10 years (n=37)	10-15 years (n=33)	>15 years (n = 22	P
See premature babies in practice?	Yes	31 (88.6)	36 (97.3)	31 (93.9)	21 (95.5)	0.477
	No	4 (11.4)	1 (2.7)	2 (6.1)	1 (4.5)	
Consider osteopenia a significant concern?	Yes	22 (62.9)	25 (67.6)	19 (57.6)	11 (50.0)	0.575
	No	13 (37.1)	12 (32.4)	14 (42.4)	11 (50.0)	
Screened osteopenia cases?	Yes	5 (14.3)	13 (35.1)	12 (36.4)	5 (22.7)	0.128
	No	30 (85.7)	24 (64.9)	21 (63.6)	17 (77.3)	
Osteopenia preventable?	Yes	21 (60.0)	26 (70.3)	24 (72.7)	18 (81.8)	0.398
	No	3 (8.6)	2 (5.4)	0 (0.0)	0 (0.0)	
	I do not know	11 (31.4)	9 (24.3)	9 (27.3)	4 (18.2)	
Osteopenia treatable?	Yes	29 (82.9)	32 (86.5)	28 (84.8)	20 (90.9)	0.791
	No	1 (2.9)	0 (0.0)	0 (0.0)	0 (0.0)	
	I do not know	5 (14.3)	5 (13.5)	5 (15.2)	2 (9.1)	

Table 4: Practices and Perceptions of Osteopenia of Prematurity by Duration in Pediatric Field.

Variables	Category	<5 years (n=35)	5-10 years (n=37)	10-15 years (n=33)	>15 years (n = 22)	P
Main cause of osteopenia?	Combination of factors	21 (60.0)	30 (81.1)	24 (72.7)	20 (90.9)	0.267
	Calcium deficiency	4 (11.4)	1 (2.7)	3 (9.1)	0 (0.0)	
	Phosphate deficiency	3 (8.6)	2 (5.4)	4 (12.1)	1 (4.5)	
	Vitamin D deficiency	5 (14.3)	4 (10.8)	2 (6.1)	1 (4.5)	
	I do not know	2 (5.7)	0 (0.0)	0 (0.0)	0 (0.0)	
Percentage affected by osteopenia?	5%	4 (11.4)	3 (8.1)	5 (15.2)	1 (4.5)	0.361
	10%	10 (28.6)	13 (35.1)	6 (18.2)	3 (13.6)	
	20%	5 (14.3)	6 (16.2)	3 (9.1)	2 (9.1)	
	40%	1 (2.9)	1 (2.7)	4 (12.1)	4 (18.2)	
	I do not know	15 (42.9)	14 (37.8)	15 (45.5)	12 (54.5)	
Main risk factor	Prematurity	18 (51.4)	20 (54.1)	18 (54.5)	12 (54.5)	0.035*
	Gestational age/weight	7 (20.0)	15 (40.5)	11 (33.3)	8 (36.4)	
	Low birth weight	8 (22.9)	2 (5.4)	1 (3.0)	0 (0.0)	
	Maternal age at birth	0 (0.0)	0 (0.0)	0 (0.0)	1 (4.5)	
	I do not know	2 (5.7)	0 (0.0)	3 (9.1)	1 (4.5)	
Best time to screen	1st week	7 (20.0)	3 (8.1)	4 (12.1)	3 (13.6)	0.936
	3rd week	7 (20.0)	8 (21.6)	10 (30.3)	7 (31.8)	
	6th week	8 (22.9)	14 (37.8)	10 (30.3)	6 (27.3)	
	1st year	3 (8.6)	2 (5.4)	2 (6.1)	1 (4.5)	
	I do not know	10 (28.6)	10 (27.0)	7 (21.2)	5 (22.7)	
Best treatment	Calcium + phosphate	22 (62.9)	27 (73.0)	16 (48.5)	16 (72.7)	0.359
	Vitamin D	7 (20.0)	8 (21.6)	7 (21.2)	4 (18.2)	
	Calcium	3 (8.6)	0 (0.0)	3 (9.1)	0 (0.0)	
	Phosphate	0 (0.0)	0 (0.0)	1 (3.0)	0 (0.0)	
	I do not know	3 (8.6)	2 (5.4)	6 (18.2)	2 (9.1)	

Discussion

The study aimed to assess the awareness, knowledge, and practice of pediatricians for osteopenia in preterm infants among healthcare providers in Iraq. The results demonstrated that almost all paediatricians have come across a premature baby and/or have the pneumonic of Osteopenia being an important entity, yet no one check for osteopenia. However, most stated that the uncertainty surrounding osteopenia was not a reason to be inactive and felt strongly that the condition is both preventable and treatable. Furthermore, the majority of the doctors viewed a combination of different causes as the primary etiology for osteopenia. Concerning the total percentage of infants affected, the major response was "don't know" which represents poor level of correct knowledge. The major predictive factor of osteopenia is prematurity and the types of treatment used among all groups was calcium followed by phosphate. Previous surveys has shown similar pattern of practice in others states of INDIA. Harrison et al., UK, 2012; OOP screening, monitoring and treatment practices were highly variable: a survey of 72% of level 2–3 neonatal units in the UK and Eire found that there was no consensus regarding which infants had been screened, or on what surveillance to use or how to manage biochemical findings [9]. The national survey found that although diagnostic tests were available, practices varied from standard biochemical panels to relying on clinical signs alone (5). The results of our present study suggest that there is a general awareness regarding osteopenia as an important health issue, but the screening for this condition is not given high priority. Research by Perronel et al (11) gives similar results. in Italy and Torro-Ferrero et al [12]. This is confirmed by the observations of the «Breast Cancer Screening Program in Spain» where states that early diagnosis is a key component and contrasts this with reality, since its practical application seems to be at times partial, due to there are shortcomings.

• However, only 70.1% of respondents thought that osteopenia was preventable and 85.6% considered it treatable This is in keeping with

the remarkable expectations of the patients towards their illness as reported by PV Creed et al [13] and MRC Pinto [14]. But what the perceptions provided simply did not translate to reality. In particular, over two-thirds (68.3%) acknowledged that they use a combination CaP regimen while only 20.5% indicated the use of active vitamin D, though it is recommended for concurrent treatments by most practice standards. This discrepancy within the realm of theoretical knowledge and clinical practice is more than likely due to a lack of hands-on training or limited access to respective supplements [15]. A whole range of reasons can be playing a role in the occurrence osteopenia in preterm infants; they include the deficiency of vitamin D, calcium, and phosphorus as well as disturbance in bone metabolism. In addition, prematurity itself is a major risk factor, as the majority of fetal bone mineralization occurs in utero during the late gestational period and premature infants do not have this exposure. Therefore, these children are missing the important bone growth and mineral accretion that occurs in utero [16-17]. Our present findings reinforce this conceptualization by identifying osteopenia in the premature infant as a complex disorder, whose primary etiological factors are prematurity per se and concomitant metabolic perturbations. Osteopenia treatment in the pediatric population should come from a perspective of knowledge that addresses comprehensively underlying an etiology and is followed by multimodal therapy management. Management strategies in osteopenia are directed towards prevention of progression to osteoporosis and reduction of complications associated with it such as fractures and skeletal deformities. The appropriate pharmacological interventions, including calcium and vitamin D supplementation, are critical for the treatment of this disorder [18]. Comorbidities that contribute to bone loss should be addressed and managed, and medications that affect bone metabolism must be carefully recalibrated. The treatment plans are custom made for each patient depending on the clinical scenario. In summary, osteopenia in pediatric patients can be diagnosed with knowledge of the most accurate adjuncts available [13], and it is important for physicians to recognize that proper early diagnosis, lifestyle modification including adequate nutritional support, and effective management of underlying disorders play major roles in the achievement of better outcomes in treating children for osteopenia. These data along with our findings demonstrate the immediate need for a national guideline and unified protocols in Iraq. A short, evidence-based guideline for OOP (including risk stratification, i.e. gestational age <32 weeks or birthweight <1,500 g; timing of biochemical screening (4–8 weeks postnatal age), radiographic assessment and proposed mineral supplementation) may contribute to diminishing practice variation and enhances early detection of this challenging condition. Integrating OOP modules into pediatric residency curricula and providing specific continuing-medical-education workshops might also help to fill continuing knowledge gaps. Study limitations included self-reported practices—prone to recall and social-desirability biases—and the over-representation of some governorates that might impact generalizability. Similarly, we did not associate levels of awareness with patient outcomes (e.g., fracture rates or bone mineral density measurements).

Conclusion

Despite caring for preterm babies every day, many pediatricians in Iraq aren't fully aware of how to spot or manage osteopenia of prematurity. They know it's a problem and believe it can be prevented and treated, but this knowledge often doesn't turn into action. Screening is rare, understanding of how common it has remained low, and treatment especially the use of vitamins is inconsistent.

These gaps aren't due to a lack of care, but likely stem from missing guidelines, limited training, and challenges within the healthcare system. The good news? This study shows us exactly where we can improve. By creating simple national guidelines, adding bone health to medical training, and supporting doctors with practical tools, we can ensure that every premature baby in Iraq has a stronger start in life.

It's not just about bones it's about giving our smallest, most vulnerable patients the chance to grow up healthy and strong.

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Data Availability

Upon reasonable request, the data from the research may be obtained from the corresponding author.

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