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KNOWLEDGE REGARDING DEVELOPMENTAL MILESTONES OF CHILDREN UNDER 3 YEARS OLD AMONG SAMPLE OF MOTHERS IN BAGHDAD CITY

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ABSTRACT

Background: Understanding of developmental milestones is crucial for early detection of delays and ensuring appropriate interventions in young children. Mothers play a key role in monitoring these milestones. **Objective of the study:** To evaluate the level of knowledge among mothers in Baghdad regarding developmental, examining factors influencing maternal awareness, assessing knowledge of appropriate ages for stimulation activities. **Methodology:** A descriptive cross-sectional study was carried out from March to December 2024 at Baghdad Medical City Hospital. The research utilized a structured questionnaire that included demographic data, sources of information, and the Caregiver Knowledge of Child Development Inventory. A sample of 400 mothers was recruited through convenience sampling, and statistical analysis was performed using SPSS version 29, with chi-square tests used to explore associations. **Results:** The findings revealed that only (5%) demonstrating "good" knowledge, while (45.8%) and (49.3%) had "fair" and "poor" knowledge, respectively. Awareness was particularly low for gross and fine motor development (6%) with good knowledge. By contrast, knowledge of cognitive and socio-emotional milestones for toddlers was relatively higher (30%) with good knowledge. Significant relationships were identified between maternal education, working status, and number of children, and levels of knowledge ($p<0.05$). A majority of mothers (61.3%) reported relying on personal experience as their primary information source, with minimal use of healthcare resources. **Conclusion:** The study showed notable gaps in maternal knowledge regarding child developmental milestones and initiation of stimulating activities.

KEYWORDS: Knowledge, Developmental, Milestones, Children, Mothers.

INTRODUCTION

Developmental milestones refer to age-specific functional skills that most children are expected to attain within a predictable timeframe.[1] Although individual variation in growth and behavior is expected, child development generally follows an established and sequential pattern across multiple domains, including physical, cognitive, social, and emotional development[2] These milestones are conventionally classified into four major domains: motor development (gross and fine), speech and language (expressive and receptive), cognitive development, and social–emotional development. Delays may occur in one domain or affect several domains simultaneously, potentially signaling underlying developmental disorders.[3] Failure to achieve expected milestones warrants careful assessment, as it may indicate developmental delay requiring early intervention.[4] The early years of life constitute a critical window for brain development and lifelong health. During this period, neural connections form at an exceptional rate, exceeding one million synapses per second, a pace unmatched at any later stage of life.[5] These neural networks are shaped by environmental interactions and early experiences, highlighting the importance of stimulation and responsive caregiving in early childhood. Notably, by the age of three years, the brain reaches approximately 80% of its adult volume, underscoring the rapid and profound neurological growth occurring during this phase.[6] From birth to three years, children undergo remarkable transformations,

progressing from complete dependence to increasing autonomy, communication, and purposeful movement.[7] The acquisition of fine and gross motor skills during this period also plays a vital role in supporting neurocognitive development.[8] Monitoring developmental milestones is essential for the early detection of developmental disabilities, enabling timely and effective interventions. Parents, particularly mothers, play a pivotal role in observing developmental progress and identifying early warning signs.[9] Maternal knowledge of child development stages is crucial for tracking both physical and cognitive growth and ensuring appropriate responses to developmental needs.[10] Evidence indicates that effective parenting practices are closely associated with a mother's understanding of developmental milestones, leading to improved developmental outcomes for children.[11] Informed mothers are better equipped to provide stimulating environments, maintain realistic expectations, and engage positively with their children.[12] Furthermore, pediatric healthcare often relies heavily on maternal observations, making maternal awareness of developmental delays critical for early diagnosis and intervention.[13] Consequently, assessing baseline maternal knowledge is fundamental for designing effective public health education programs aimed at enhancing early childhood development.[15] In addition, child-stimulating activities, particularly play-based interactions, are essential for achieving developmental milestones. Play enhances curiosity, motivation, and learning, with neuroimaging studies demonstrating activation of brain regions associated with memory and learning during curiosity-driven engagement.[16] Interactive play and high-quality mother–child interactions have been shown to significantly influence language, cognitive, and social development, especially during the first years of life.[17]

OBJECTIVE OF THE STUDY

To evaluate the level of knowledge among mothers in Baghdad regarding developmental, examining factors influencing maternal awareness, assessing knowledge of appropriate ages for stimulation activities.

METHOD

This quantitative cross-sectional study was conducted at the Medical City Complex in Baghdad, Iraq. Data were collected from mothers attending the obstetric consultation clinic at Baghdad Teaching Hospital and the pediatric consultation clinic at the Children Welfare Teaching Hospital. The study was carried out from 1 March to the end of December 2024. The target population comprised Iraqi mothers residing in Baghdad city. The study sample consisted of mothers attending consultation waiting rooms at the Medical City Complex. A convenience sampling method was used.

Inclusion and exclusion criteria: Mothers of any age who had a full-term child aged ≤3 years and were willing to participate were included. Mothers of children diagnosed with chronic conditions that could affect development, such as hypothyroidism or neurological disorders, were excluded, as these conditions might influence maternal knowledge of normal developmental milestones. Data were collected through a structured questionnaire administered via face-to-face interviews by the principal researcher. The questionnaire consisted of three parts: sociodemographic characteristics, sources of maternal information about child development, and maternal knowledge assessment using the Caregiver Knowledge of Child Development Inventory (CKCDI). The CKCDI, developed by Ertem et al. in 2007, comprises 20 items covering developmental skills and developmental stimulation. It was professionally translated into Arabic and validated for content accuracy by community and family medicine specialists. Responses were scored from 0 to 2, yielding a total score range of 0–40, with higher scores indicating better knowledge. Data were entered and analyzed using SPSS version 29. Descriptive statistics were used to summarize variables, and the chi-square test was applied to assess associations between maternal knowledge levels and sociodemographic factors. A p-value ≤0.05 was considered statistically significant. Ethical approval was obtained from the Research and Ethics Committee of Al-Kindy Medical College. Verbal informed consent was obtained from all participants, and confidentiality of collected data was ensured.

RESULTS

This study included 400 mothers, the main age group was between 30-34 years old (36.8%) with a mean age of 31.1years, with almost equal percentage (23.8%, 23.5%) had three, five children or more, respectively. Majority (81%) of mothers have children above 3 years old, for education level the highest proportion of mothers (27.8%) had college degree or higher, followed by almost equal percentage (23.5%) with primary education (23%) illiterate. The non-working mothers represent the majority (74.3%) and (54%) of mothers lived in nuclear family. **(Table 1)**

Table 1: Distribution of studied sample according to socio-demographic Variables (N=400)

Variable		No.	%
Mother age (years)	<20	12	3.0
	20-24	66	16.5
	25-29	59	14.8
	30-34	147	36.8
	35-39	67	16.8
	≥40	49	12.3

	Mean±SD	31.1±6.4 (16-46)	
Number of children	One	59	14.8
	Two	79	19.8
	Three	95	23.8
	Four	73	18.3
	Five & more	94	23.5
	Mean±SD	3.4±1.7 (1-9)	
Have children above 3 years	Yes	324	81.0
	No	76	19.0
Educational level	Illiterate	92	23.0
	Primary	94	23.5
	Intermediate	70	17.5
	Secondary	36	9.0
	College & higher	108	27.0
Working mother (occupation)	Yes	103	25.8
	No	297	74.3
Family type	Nuclear	216	54.0
	Extended	184	46.0

The study revealed that only (5.0%) of mothers achieved "good" knowledge, (45.8%) of mothers in the "fair" range, with nearly half (49.3%) of mothers possessed "poor" knowledge level. **(Figure 1)**

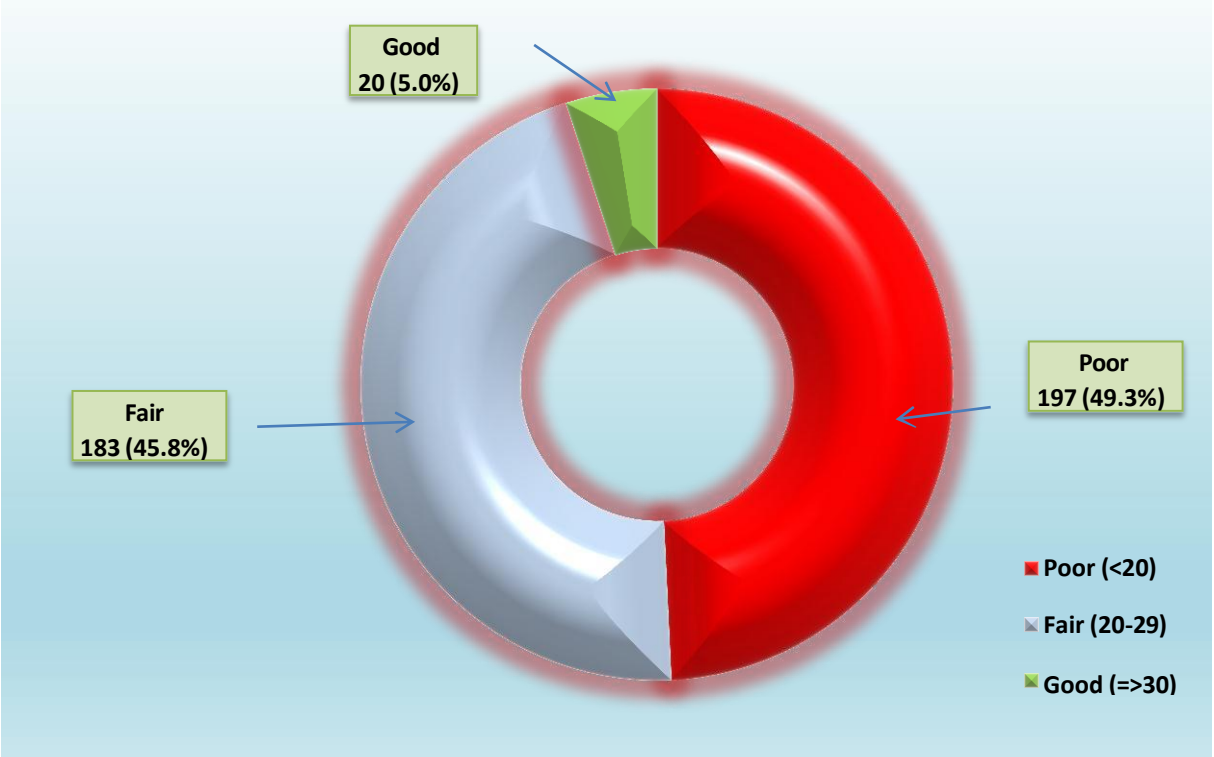

Figure (1): Overall Mother's Knowledge level regarding child developmental milestone.

As shown in (Table 2) only (13.8%) of mothers had good knowledge regarding Cognitive & social-emotional development of young infants, (42%) had poor knowledge. Regarding Cognitive & social emotional development of toddler's good knowledge was the highest among other domains with (30%) of mothers had good knowledge. Mother knowledge regarding gross & fine motor development was the lowest one as only (6%) of mothers had good knowledge with more than half of mother (58.8%) had poor knowledge.

Table (2): Distribution of mother knowledge regarding developmental milestone according to domains (N=400)

Knowledge domains		No.	%
I-Cognitive & social-emotional development of young infants (7Q=1-2-3-4-5-11-12)	Poor	168	42.0
	Fair	177	44.3
	Good	55	13.8
	Mean±SD (Range)	6.9±3.3 (0-14)	
II-Cognitive & social emotional development of toddlers (6Q=6-7-13-14-15-16)	Poor	144	36.0
	Fair	136	34.0
	Good	120	30.0
	Mean±SD	6.5±3.3 (0-12)	
III-Gross & fine motor development (7Q=8-9-10-17-18-19-20)	Poor	235	58.8
	Fair	141	35.3
	Good	24	6.0
	Mean±SD	6.0±2.8 (0-14)	

We found that only (17.3%) of mother know that brain begin to develop from utero or from birth, only (34.5%) of mothers know about proper time infant begin to vocalize and (36.5 %) of mothers know that children begin to see from birth. **(Figure 2).**

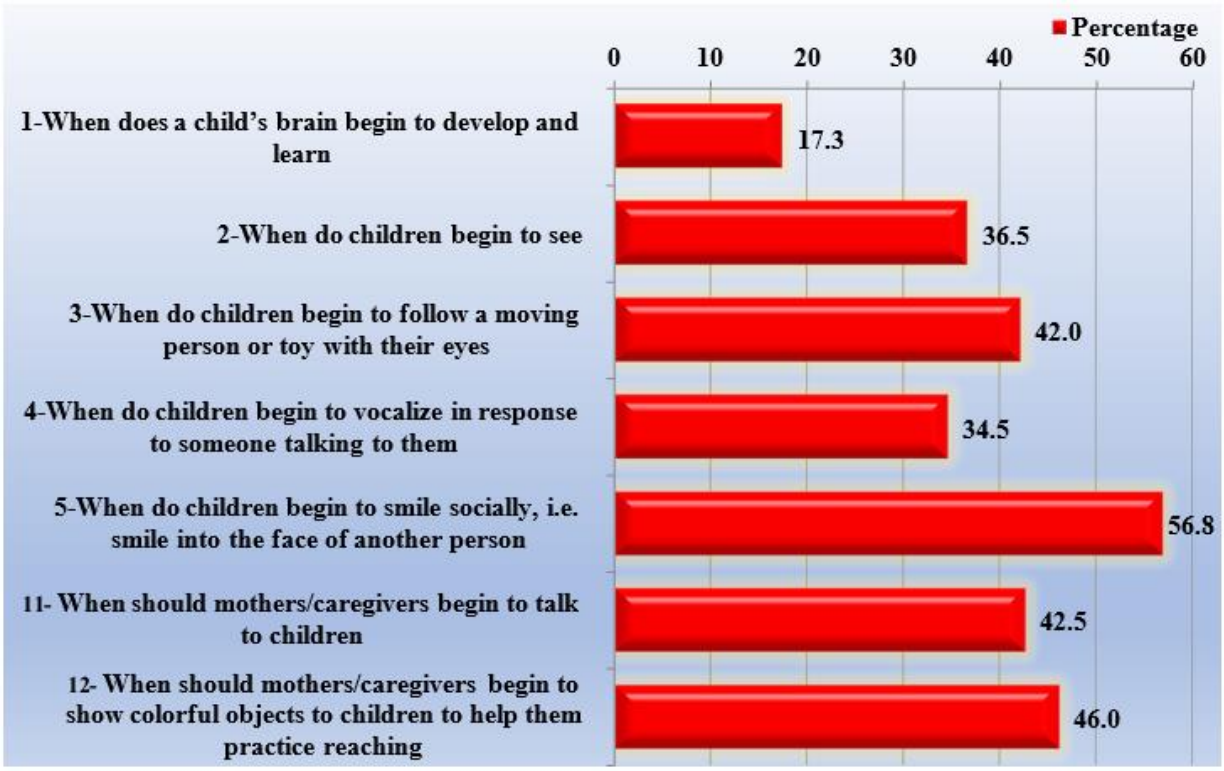

Figure (2): Mother's knowledge regarding cognitive & social-emotional Development of young infants.

Knowledge regarding when children begin to engage in imaginary play was the highest in this domain, with (65.5%) of mothers responding correctly. Conversely, knowledge regarding self-feeding was notably the lowest as only (36.5%) of mothers know when it was the appropriate time to give spoon or fork to let toddler eat by themselves. (Figure 3).

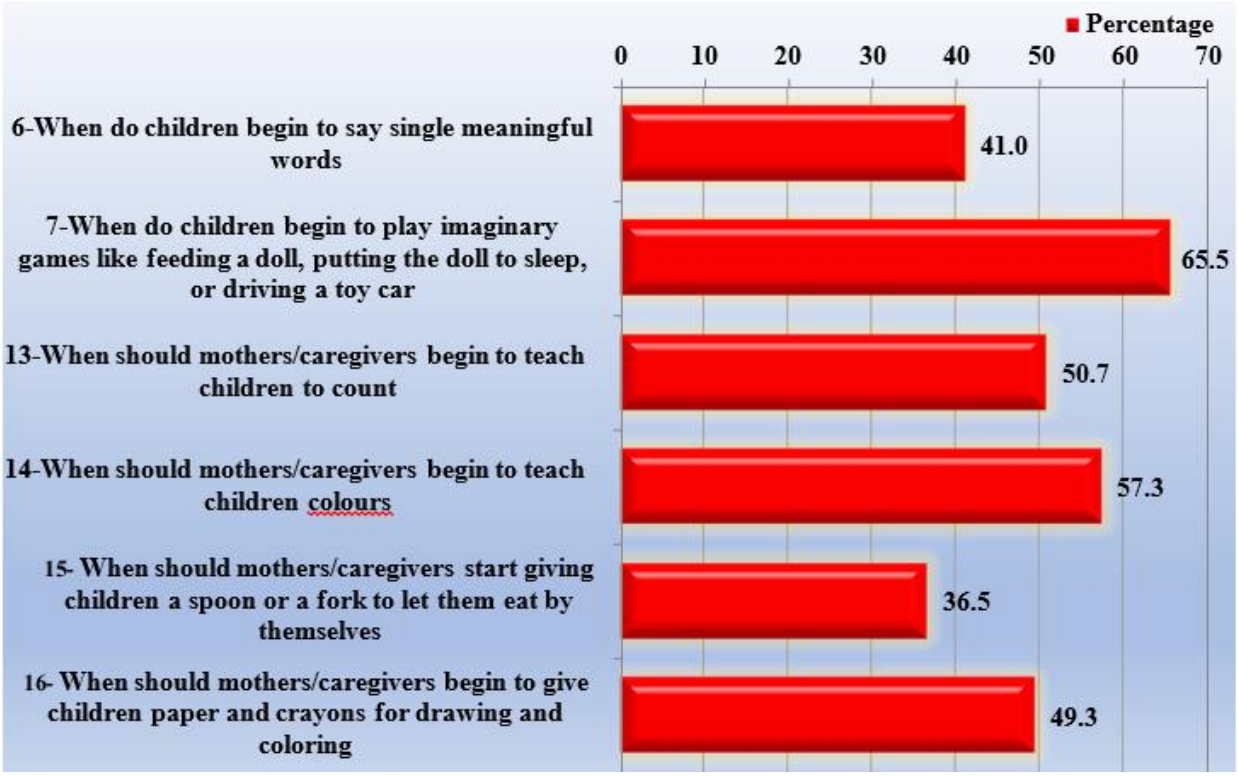

Figure (3): Mother's knowledge regarding cognitive & social-emotional development of toddlers.

The highest level of correct responses was observed in the question about when children begin to walk alone with good coordination, with (76.5%) of mothers answering correctly.

However, mothers' knowledge regarding sit with support (36.5%) and grasping tiny objects (32.3%) was relatively low. **(Figure 4).**

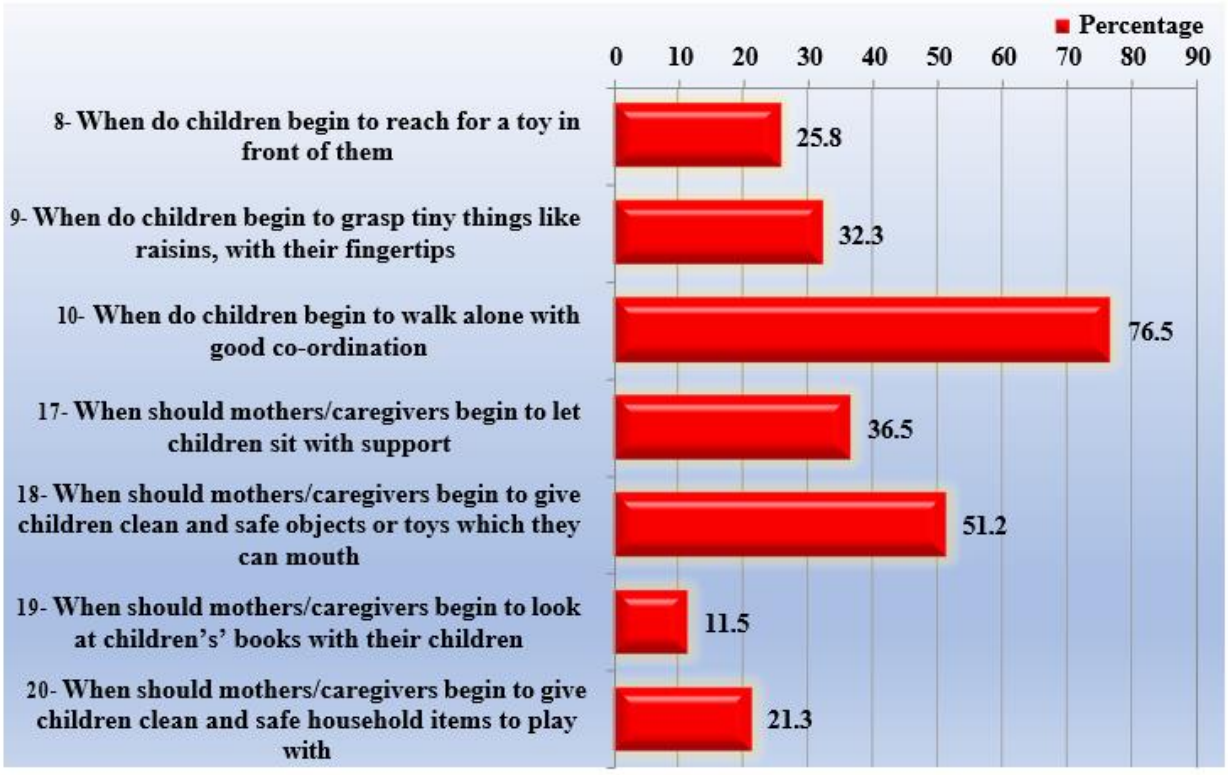

Figure (4): Mother's knowledge regarding gross & fine motor development.

Regarding mother knowledge about appropriate time to start activities to stimulate children abilities it was found that (57.5%) of mother know about the appropriate time to start teaching children colors, with nearly half of mothers (51.2%, 50.7%, 49.3%) know the appropriate time to give toys to children to play with, start teaching children counting and give them paper and crayon to draw. **(Figure 5)**

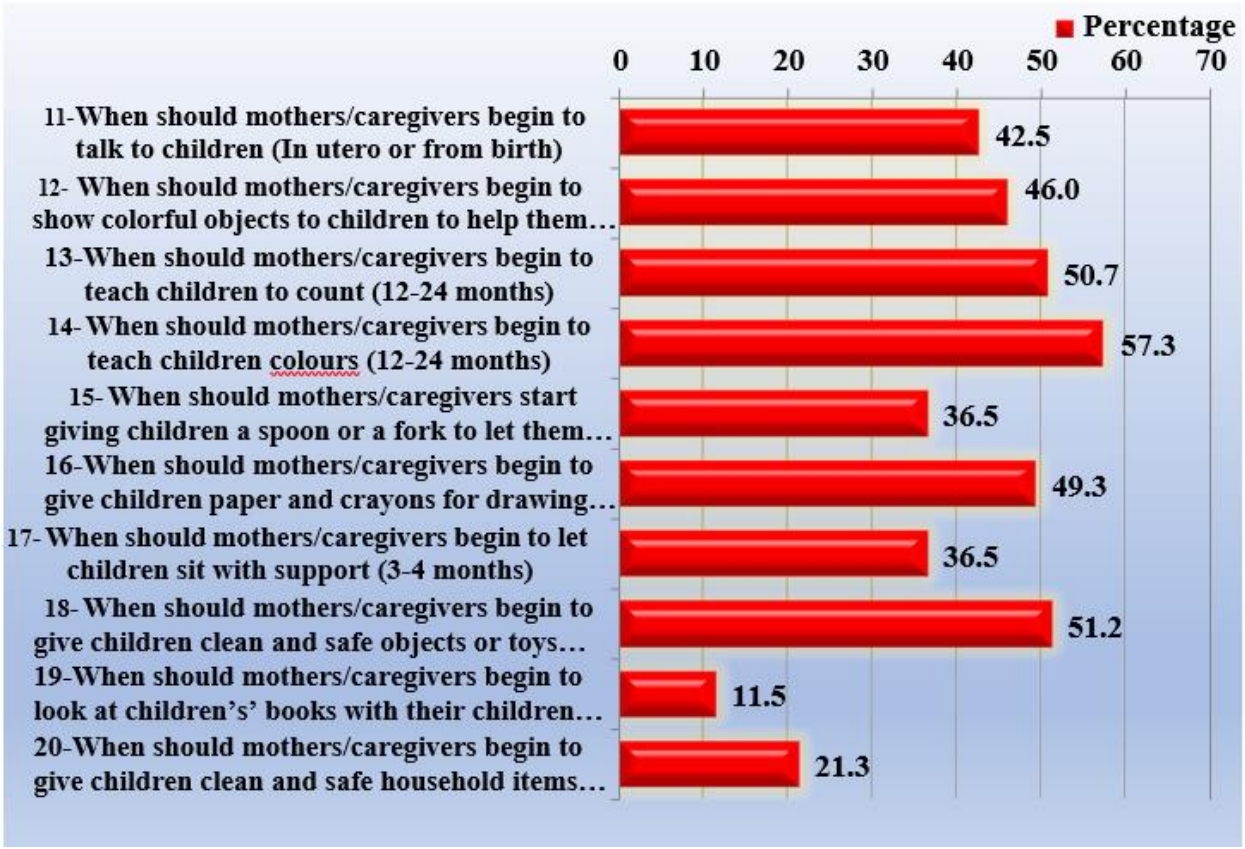

Figure (5): Mother knowledge about appropriate time to start activities to stimulate children abilities.

The association between mother socio demographic factors and their knowledge regarding child development is clarified in (Table 3). Mother's age and the type of family (nuclear vs. extended) didn't not show a significant difference in knowledge levels. There was a significant association between mother knowledge and number of children (p. value 0.0001), fifty-five (55.0%) of mothers with good knowledge had two children, where the percentage of good knowledge drops significantly in those with three or more children. Majority of mothers, specifically eighty sixty (86.3%) of mothers with poor knowledge had children older than 3 years old compared to those who have only children below 3 years old and the association was statistically significant (p. value 0.005). The higher percentage (60%) of mothers with good knowledge had a college education or higher with significant association (p. value 0.003). The majority of mothers (75.0%) with good knowledge are working mothers with also significant association (p. value 0.0001).

Table 3: Association between mother' level of knowledge and their socio demographic variables (N=400)

		Mother's knowledge regarding child development						P value
		Poor (n=197)		Fair (n=183)		Good (n=20)		
		No.	%	No.	%	No.	%	
Mother age (years)	<20	5	2.5	6	3.3	1	5.0	0.694
	20-24	32	16.2	31	16.9	3	15.0	
	25-29	34	17.3	21	11.5	4	20.0	
	30-34	74	37.6	64	35.0	9	45.0	
	35-39	32	16.2	33	18.0	2	10.0	
	≥40years	20	10.2	28	15.3	1	5.0	
Number of children	1	22	11.2	31	16.9	6	30.0	0.0001*
	2	29	14.7	39	21.3	11	55.0	
	3	56	28.4	37	20.2	2	10.0	
	4	42	21.3	30	16.4	1	5.0	

	5	48	24.4	46	25.1	-	-	
Have children above 3 years	Yes	170	86.3	142	77.6	12	60.0	0.005*
	No	27	13.7	41	22.4	8	40.0	
Educational level	Illiterate	52	26.4	39	21.3	1	5.0	0.003*
	Primary	48	24.4	44	24.0	2	10.0	
	Intermediate	41	20.8	27	14.8	2	10.0	
	Secondary	11	5.6	22	12.0	3	15.0	
	College & higher	45	22.8	51	27.9	12	60.0	
Working mother (occupation)	Yes	42	21.3	46	25.1	15	75.0	0.0001*
	No	155	78.7	137	74.9	5	25.0	
Family type	Nuclear	107	54.3	97	53.0	12	60.0	0.831
	Extended	90	45.7	86	47.0	8	40.0	
*Significant difference between percentages using Pearson Chi-square test (χ^2-test) at 0.05 level.								

This study revealed that 245 (61.3%) of the respondents depend on their own experience with their current or previous child as the main source of information, information obtained from pediatrician (6.5%) and physician at primary health care (1.5%) was the lowest as shown in (Figure 6).

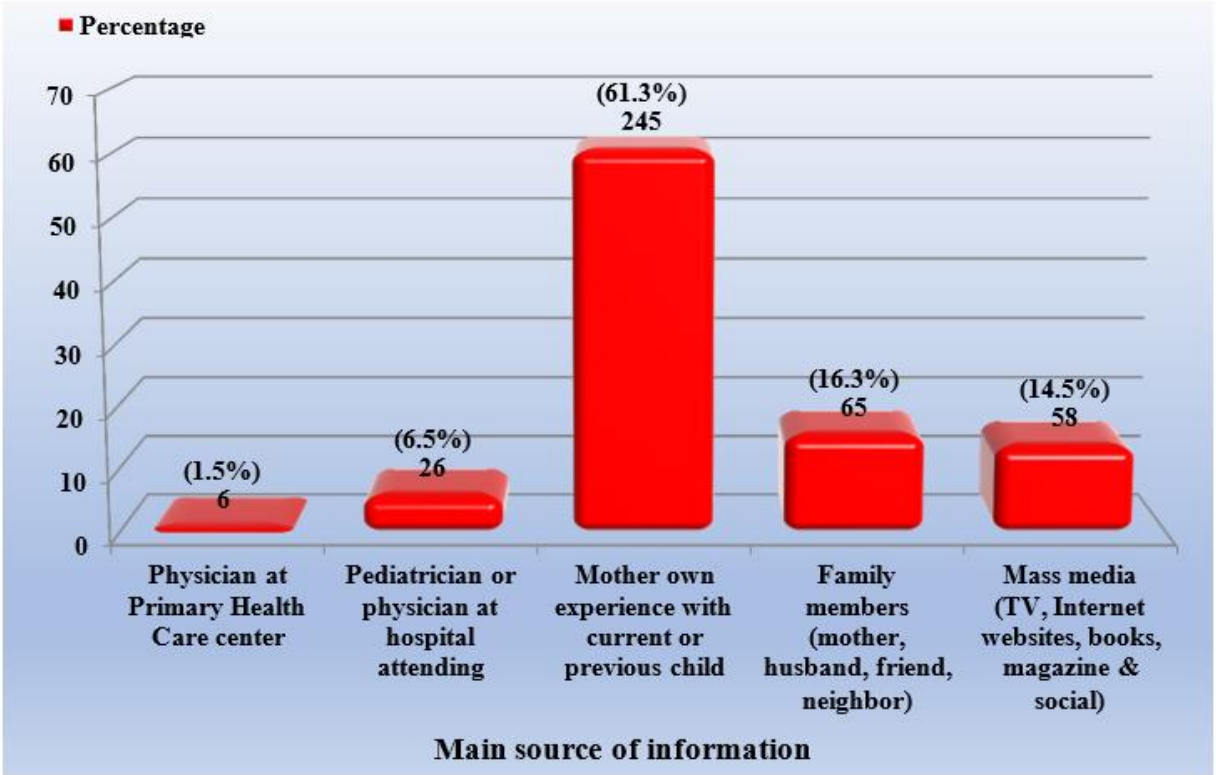

Figure (6): Distribution of mothers according to main source of information regarding developmental milestone of children below three years old (N=400).

As shown in the table (Table 4), (60%) of mothers with good knowledge had their main source of information from mass media (TV, Internet, Website, books, magazine & social). While (74.6%) of mother with poor knowledge had their own experience with current or previous child as the main source of information. Alarmingly, the lowest reliance on physicians at primary health care centers was observed across all knowledge levels, with no mothers with "good" knowledge sourcing information from these centers.

Table (4): Association between source of mother's information regarding child development and their knowledge level (N=400).

II-Source of mother's information regarding child development	Mother's knowledge regarding child development						P value
	Poor (n=197)		Fair (n=183)		Good (n=20)		
	No.	%	No.	%	No.	%	
Physician at Primary Health Care center	4	2.0	2	1.1	-	-	0.0001*
Pediatrician or physician at hospital attending	6	3.0	14	7.7	6	30.0	
Mother own experience with current or previous child	147	74.6	98	53.6	-	-	
Family members (mother, husband, friend, neighbor)	28	14.2	35	19.1	2	10.0	
Mass media (TV, Internet websites, books, magazine & social)	12	6.1	34	18.6	12	60.0	
*Significant difference between percentages using Fisher's Exact test at 0.05 level.							

DISCUSSION

Maternal knowledge of developmental milestones plays a pivotal role in promoting optimal early childhood growth, facilitating early recognition of developmental delays, and encouraging timely intervention.[17] The present study revealed substantial gaps in maternal awareness of child developmental milestones, with nearly half of the participants demonstrating poor overall knowledge and only a very small proportion achieving a good knowledge level. These findings underscore an urgent need for structured educational interventions targeting mothers of young children. The overall low level of maternal knowledge observed aligns closely with previous Iraqi studies. Alkhazrajy reported that more than half of mothers in Baghdad had poor knowledge of cognitive developmental milestones[18], while Saadi similarly documented limited maternal awareness across all developmental domains in Erbil.[19] Comparable findings have also been reported regionally, including in Saudi Arabia, where Aldayel et al. found that 80% of mothers had poor developmental milestone knowledge.[20] Collectively, these studies suggest that inadequate maternal knowledge remains a widespread issue across Middle Eastern contexts. In contrast, higher knowledge levels reported in Sri Lanka.[21] likely reflect differences in healthcare infrastructure, particularly the integration of maternal education into routine antenatal and postnatal care. In the present study, maternal knowledge regarding cognitive and social-emotional development in infants and toddlers was generally limited. These findings are consistent with studies from Jordan and Saudi Arabia, which reported low awareness of early cognitive and emotional milestones.[22] However, higher knowledge levels reported in Karbala, Iraq[23], and Tamil Nadu, India[24], may be attributed to differences in maternal education, healthcare access, or sampling characteristics. Alarmingly, awareness of early brain development was notably low in the current study, falling well below levels reported in Turkey using the same CKCDI tool[25], indicating missed opportunities for early stimulation. Knowledge of gross and fine motor development was also poor, except for highly visible milestones such as walking. Similar deficits have been documented in Baghdad and Erbil[18,19], whereas significantly higher knowledge levels in Sri Lanka[21] suggest that systematic public health education can improve maternal understanding of motor milestones. The widespread recognition of walking age supports the notion that socially emphasized milestones are more readily remembered. Significant associations were identified between maternal knowledge and several sociodemographic factors. Maternal education and employment were positively associated with higher knowledge levels, consistent with Iraqi studies[18,19], likely reflecting greater access to information and social networks. Conversely, increasing family size was associated with lower knowledge scores, echoing findings by Ertem et al.[25], possibly due to caregiving burden. No association was observed with maternal age or family structure, consistent with some regional studies[22], suggesting that experience alone does not guarantee adequate knowledge. Regarding information sources, most mothers relied on personal experience rather than healthcare professionals, a pattern previously reported in Baghdad.[18] Mothers with good knowledge predominantly cited mass media and pediatricians as information sources, similar to findings from Saudi Arabia.[26] However, reliance on non-professional online sources raises concerns about information accuracy, emphasizing the need for culturally adapted, evidence-based Arabic health resources from trusted organizations such as the WHO.

Limitations

This study did not assess socioeconomic status, which may influence access to information and healthcare services. Addressing this factor in future research could provide a more comprehensive understanding of determinants of maternal knowledge.

CONCLUSION

Critical gaps in maternal knowledge regarding developmental milestone. Mother knowledge regarding gross & fine motor development was the lowest one. Significant gaps in maternal knowledge regarding the appropriate timing to initiate stimulation activities for young children. Significant associations were observed between maternal knowledge and socio-demographic

factors, such as education, working status, number and age of children. The main source of maternal knowledge was personal experience.

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