

*COMMON PITFALLS REGARDING
COMPLEMENTARY FEEDING PRACTICES AMONG
HEALTH CARE PROVIDERS IN PEDIATRICS
DEPARTMENTS OF SOME ALEXANDRIA
HOSPITALS*

By

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ABSTRACT

Background: *The health and well-being of the child depends on the attainment of appropriate nutritional requirements which include breast or formula feeding followed by proper complementary feeding.*

Objective: *To assess the current awareness of pediatric health care providers at some of Alexandria hospitals (Alnfoshy, Ras-El Teen, Fawzy Moaz hospitals) regarding complementary feeding practices.*

Patients and Methods: *This study is a comparative cross-sectional questionnaire-based study conducted among 264 health care providers (187 physicians and 77 nurses) working in pediatric departments of the above-mentioned hospitals in Alexandria. The questionnaire consisted of 17 items based on the recent evidence-based clinical practice guidelines for complementary feeding practices in Egypt, June 2018. Data was collected over 12 months and coded manually and analyzed by using statistical package for social science version 25.*

Results: *The studied healthcare providers (both physicians & nurses) experience inadequate knowledge in several aspects of complementary feeding. For physicians, the main pitfalls regarding complementary feeding that deviated from the recommended guidelines were for: time of honey introduction (86.6%), fruit juice introduction (63.1%), introduction of yogurt and dairy products (49.7%), advisable first food (47.1%) and water in non-breast feed infants (55.6%) respectively.*

Conclusion: *The present study demonstrated that knowledge of the studied pediatric health care providers is not optimum in several aspects of complementary feeding and need to be updated and enhanced by regular training courses and follow up in that field.*

Keywords: Common pitfalls, complementary feeding.

INTRODUCTION

The first 2 years of the child's life are particularly important, as optimal nutrition during this period lowers morbidity and mortality, reduce the risk of chronic disease, and foster better development overall (WHO, 2021).

Complementary feeding (CF) as defined by the World Health Organization (WHO) is "the process starting when breast milk alone is no longer sufficient to meet the nutritional requirement of infant so that other food and liquid are needed along with breast milk (WHO, 2021).

Insufficient quantities and inadequate quality of complementary foods, together with poor feeding practices and increased rates of infection during this period are direct risk factors for stunting (Danaei et al 2016; Andrews et al 2016; Sudfed et al 2016; Fink et al 2016; McCoy et al 2016; Peet et al 2016; Sania et al 2016; Smith et al 2016; Ezzati et al 2016 and Fawzi et al 2016).

To promote optimal child growth and development, the WHO recommends exclusive breastfeeding (EBF) for the first 6 months of life followed by continued breastfeeding and

gradual introduction of appropriate and safe complementary foods until age 23 months (WHO, 2021).

In most countries, the majority of the decline in length-for-age during the first 2 years of life occurs during the complementary feeding period, between 6 and 23 months of age (Dewey et al 2009 & Huffman et al 2009).

In Egypt most health surveys showed that considerable percentage of children aged 6-23 months were suffering from stunting, Protein energy malnutrition (PEM) and micronutrients deficiencies especially iron, vitamin A and D (Amr et al., 2012; El-Alfy et al., 2012 and El-Rifai et al., 2013). This may be due to lack of nutritional guidelines specially for CF, socioeconomic and cultural factors.

In contrast to the large literatures on breast and formula feeding less attention has been paid to complementary feeding period. The more limited scientific evidence base is reflected in considerable variation in complementary feeding recommendation and practices between and within countries (Fewtrell et al., 2017).

AIM OF THE STUDY

To assess the current awareness of pediatric health care providers regarding complementary feeding practices in some Alexandria hospitals (Anfoshy, Ras-El Teen and Fawzy Moaz) in order to put a plan for application of the optimal complementary feeding practices as recommended by the recent evidence based Egyptian guidelines, 2018.

SUBJECTS AND METHODS

This is a comparative cross-sectional study that was carried out to detect the common pitfalls regarding CF practices among health care providers in pediatric departments of some Sohag hospitals in order to put a plan for application of the optimal complementary feeding practices as recommended by the recent evidence based Egyptian guidelines, June 2018.

Ethical consideration:

- Approval by the ethical committee of Al-Azhar Faculty of Medicine was obtained before the study.
- An informed written consent was obtained from all participants before getting them involved in the study.
- The steps of the study, the aim and the potential benefits all

were discussed with the participants.

- Confidentiality of all data were ensured.
- The physicians and nurses had the right to withdraw from the study at any time without giving any reasons.
- No conflict of interest regarding the study or publication.

Disclosure of finance: no financial support for the study and publication.

Sample size:

The studied sample included 264 of health care providers, 187 physicians with a mean age 33.4 ± 7.2 years and 77 nurses with a mean age 30.4 ± 7.7 year. They were randomly selected from Anfoshy, Ras-El Teen and Fawzy Moaz at Alexandria government.

I. Technical design:

Study design: this is a comparative cross-sectional study that was carried out to detect the common pitfalls regarding CF among health care providers in pediatric departments in Alexandria government hospitals in order to put a plan for application of the optimal complementary feeding practices as recommended by the recent

evidence based Egyptian guidelines, June 2018.

II. Sampling technique:

Study setting: the study was conducted at all pediatric ward's inpatient and outpatient of Anfoshy hospital, Ras-El Teen hospital and Fawzy Moaz hospital all belong to ministry of health.

Subjects: all health care providers (physicians and nurses) that care for neonates, infants, children, were recruited from pediatric department of the previously mentioned hospitals. The total number of possible participants in the designated hospitals during the time of the study was approximately 187 physicians, 77 nurses. They were chosen every other day using simple randomization during the period from June 2019 to March 2020.

Inclusion Criteria: Egyptian pediatrician and nurses working in pediatric departments in previously mentioned hospitals and willing to participate.

Exclusion Criteria: other Specialists and general practitioners.

Methods:

The questionnaire: after explaining of the purpose of the study, an informed consent was obtained from the studied health care providers before fulfillment

of the face-to-face structured interview questionnaire. The designed questionnaire was prepared to meet the objectives of the study to identify common pitfalls regarding complementary feeding practices among studied health care providers and the questionnaire started by taking personal data: age, sex, affiliation, mobile number, place of work, duration of experience and workshops regarding complementary feeding.

Then the questionnaire included 11 questions about various items of complementary feeding that were verified as follows: duration of exclusive breast feeding: the correct duration according to **WHO (2010)** is six months, time of introduction of Solid Foods: - According to WHO recommendations, WHO (2010) the best time is sixth months, first food is advised to be introduced suggested to be iron fortified cereals in **Egyptian guidelines (2018)**, recommended daily frequency of meals for age groups: -Meals of Complementary Foods Should be provided 2-3 times per day at 6-12 months of age and 3-4 times per day at 12 - 24 months of age **WHO (2003)**, time of introduction of whole cow's milk: is after one-year-old age; **WHO (2003)**, time of introduction of yogurt and dairy product: - the

correct answer is at age of sixth months **WHO (2003)**, the best time to introduce honey: is at age of nine months' **Egyptian guidelines (2018)**, time of introduction of Fruit Juice to infant: the correct answer is not before one year **Egyptian guidelines (2018)**, time of water to be introduced to breastfed infant and non-breastfed infant: Breastfed infants: with solid foods & no breast fed infants at 0 day, **Egyptian guidelines (2018)**, time of introduction of iron supplementation to infants: -the correct answer is six months, **Egyptian guidelines (2018)** and time of introduction of Vitamin D: The correct answer is 0day, **Egyptian guidelines (2018)**.

An Arabic version was done through the following steps for nurses to answer the questionnaire:

1. Certified bilingual approved professional translator in cooperation with researcher carried out a forward translation into Arabic.
2. The preliminary translation was revised and then subjected to backward translation to English by another bilingual approved professional translator.
3. Then both translations were compared and they were almost similar.

Statistical analysis:

This phase entailed the following: coding of data was carried out manually, data cleaning, possible entry errors were checked as well as frequency distribution and cross tabulation to ensure that all questions have valid code and values and data analysis carried out using statistical package for social science version 25.

Descriptive and analytic statistical analysis were done:

a. Descriptive statistics: quantitative data: mean and standard deviation were used to measure central tendency and dispersion and qualitative data: frequency of occurrence was calculated by number and percentage.

b Analytical statistics:

Comparing between groups was done using: students T test for Quantitative data of two independent samples. ANOVA test for more than two groups of normally distributed data and Mann-Whitney U test between two groups of non-normally distributed data.

1. Pearson Chi square test used for qualitative data.
2. The value of significance was taken at (p-value ≤ 0.05).
3. The results presented in tables and figures.

Finally, writing the thesis, discussion, English and Arabic summaries, conclusion and recommendations.

Limitation of the Study: some participants showed negative attitude & didn't show much cooperation to complete all items of the questionnaire, and they were excluded and data was collected during working days, doctors and nurses were busy and had to be contact many times to finish the target.

RESULTS

Our results will be demonstrated in the following tables:

Table (1): Distribution of physicians and nurses according to workplace

Hospital Healthcare groups	Anfoshy hospital (185)		Ras-El Teen (48)		Fawzy Moaz hospital (31)		Total (264)	
	No	%	No	%	No	%	No	%
Physicians	125	67.6	32	66.6	30	96.8	187	70.8
Nurses	60	32.4	16	33.4	1	3.2	77	29.2

Table (2): Questionnaire result by physicians according to work place

Place of work Items	Anfoshy hospital (125)		Ras-El Teen (32)		Fawzy Moaz hospital (30)		Sig. test	p.
	No.	%	No.	%	No.	%		
Age (range) mean (years) ± (SD)	27-59 34.5± 7.6		27-50 32.4± 4.8		27-58 35.5± 7.8		ANOVA = 1.6	0.2
Sex	No.	%	No.	%	No.	%	X ² =9.6	0.008*
• Male	43	34.4	20	62.5	9	30.0		
• Female	82	65.6	12	37.5	21	70.0		
Duration of experience in pediatric field							KrusKalWallis	0.000*
• Range (years)	1-30		2-24		3-30			
• Mean rank	90.4		81.5		122.4			
previous training workshops in complementary feeding	No.	%	No.	%	No.	%	X ² =8.9	0.012*
• Yes	100	80.0	18	56.2	25	83.3		
• No	25	20.0	14	43.8	5	16.7		

P≤0.05 statistically significant

The previous table shows that there was statistically significant difference between three

hospitals regarding above points except age.

Table (3): Knowledge of physicians about breastfeeding, complementary feeding, iron supplementations, Vitamin D supplementations, frequency of meals and water introduction

Items	Place of work		Anfoshy hospital (125)		Ras-El Teen (32)		FawzyMoaz hospital (30)		Sig. test	P.
	No.	%	No.	%	No.	%				
Exclusive breast-feeding duration										
• Correct (6 months)	100	80.0	26	81.2	18	60.0	X ² =5.9	0.05*		
• Incorrect	25	20.0	6	18.8	12	40.0				
Appropriate time of Introduction of solid food										
• Correct (at 6 months)	100	80.0	26	81.2	18	60.0	X ² =5.9	0.05*		
• Incorrect	25	20.0	6	18.8	12	40.0				
Advisable first food										
• Correct	69	55.2	15	46.9	15	50.0	X ² =0.8	0.7		
• Incorrect	56	44.8	17	53.1	15	50.0				
Whole cow milk introduction										
• Correct (after 1 year)	106	84.8	25	78.1	28	93.3	X ² =2.8	0.2		
• Incorrect	19	15.2	7	21.9	2	6.7				
Yogurt and dairy product introduction										
• Correct (at 6 months)	54	43.2	14	43.8	9	30.0	X ² =1.8	0.4		
• Incorrect	71	56.8	18	56.2	21	70.0				
Honey can be given to infant below one year?										
• Correct (at 9 months)	7	5.6	5	15.6	4	13.3	X ² =4.3	0.11		
• Incorrect	118	94.4	27	84.4	26	86.7				
Fruit juice introduction										
• Correct (after 1 year)	46	36.8	14	43.8	9	30.0	X ² =1.3	0.5		
• Incorrect	79	63.2	18	56.2	21	70.0				
Appropriate time of Iron										
• Correct (at 6 months)	92	73.6	26	81.2	27	90.0	X ² =4	0.1		
• Incorrect	33	26.4	6	18.8	3	10.0				
Appropriate time of Vitamin D										
• Correct (at 0 day)	119	95.2	28	87.5	29	96.7	X ² =3	0.2		
• Incorrect	6	4.8	4	12.5	1	3.3				
6- 12months old infants										
• Correct (2-3 meal/day)	102	81.6	25	78.1	25	83.3	X ² =0.3	0.8		
• Incorrect	23	18.4	7	21.9	5	16.7				
12-24months old infants										
• Correct (3-4 meals/day)	84	67.2	20	62.5	22	73.3	X ² =0.8	0.6		
• Incorrect	41	32.8	12	37.5	8	26.7				
-Breastfed infants										
• Correct (with solid food)	79	63.2	16	50.0	9	30.0	X ² =11	0.004*		
• Incorrect	46	36.8	16	50.0	21	70.0				
-Non-Breastfed infants										
• Correct (at zero day)	54	43.2	17	53.1	12	40.0	X ² =1.3	0.5		
• Incorrect	71	56.8	15	46.9	18	60.0				

P≤0.05 statistically significant

This table shows that there wasn't statistically significant difference between three hospitals except exclusive breast

feeding, appropriate time of introduction of solid food and water in breastfed infants.

Table (4): Background characteristics of the participating nurses in the studied hospitals

Place of work Items	Anfoshy (60)		Ras-El Teen (16)		Fawzy Moaz (1)		Sig. test	p.
	No.	%	No.	%	No.	%		
Age (range) mean (years) ± (SD)	21-53 30.9± 7.8		22-47 29± 7.7		27		<i>ANOVA</i> = 0.5	0.6
Sex							$\chi^2=3.6$	0.2
• Male	11	18.3	0	0.0	0	0.0		
• Female	49	81.7	16	100	1	100		
Duration of experience in pediatric field							KrusKalWallis	0.8
• Range (years)	0-35		1-20		3			
• Mean rank	39.4		38.4		23			
previous training workshops in complementary feeding							$\chi^2=0.7$	0.7
• Yes	41	68.3	12	75.0	1	100		
• No	19	31.7	4	25.0	0	0.0		

P≤0.05 statistically significant

The previous table shows that there was statistically significant difference between three

hospitals regarding all the above points.

Table (5): Knowledge of Nurses about breastfeeding, complementary feeding, Vitamin D supplementations, iron supplementations and water introduction

Items	Place of work		Anfoshy (60)		Ras-El Teen (16)		Fawzy Moaz (1)		Sig. test	p.
	No.	%	No.	%	No.	%				
Exclusive breastfeeding duration • Correct (6 months) • Incorrect	39	65.0	13	81.2	1	100	$X^2=2$	0.4		
	21	35.0	3	18.8	0	0.0				
Appropriate time of Introduction of solid food • Correct (at 6 months) • Incorrect	39	65.0	13	81.2	1	100	$X^2=2$	0.4		
	21	35.0	3	18.8	0	0.0				
Advisable first food • Correct • Incorrect	24	40.0	6	37.5	0	0.0	$X^2=0.7$	0.7		
	36	60.0	10	62.5	1	100				
Whole cow milk introduction • Correct (after 1 year) • Incorrect	50	83.3	14	87.5	1	100	$X^2=0.4$	0.08		
	10	16.7	2	12.5	0	0.0				
Yogurt and dairy product introduction • Correct (at 6 months) • Incorrect	12	20.0	7	43.8	0	0.0	$X^2=4$	0.1		
	48	80.0	9	56.2	1	100				
Honey can be given to infant below one year? • Correct (at 9 months) • Incorrect	10	16.7	3	18.8	1	100	$X^2=4.9$	0.1		
	50	83.3	13	81.2	0	0.0				
Fruit juice introduction • Correct (after 1 year) • Incorrect	22	36.7	3	18.8	0	0.0	$X^2=2.3$	0.3		
	38	63.3	13	81.2	1	100				
Appropriate time of Iron • Correct (6 m) • Incorrect	33	55.0	13	81.2	1	100	$X^2=4.3$	0.1		
	27	45.0	3	18.8	0	0.0				
Appropriate time of Vitamin D • Correct (0 day) • Incorrect	36	60.0	13	81.2	0	0.0	$X^2=4.2$	0.1		
	24	40.0	3	18.8	1	100				
6- 12months old infants • Correct (2-3 meals/day) • Incorrect	39	65.0	15	93.8	1	100	$X^2=5.2$	0.06		
	21	35.0	1	6.2	0	0.0				
12-24months old infants • Correct (3-4meals/day) • Incorrect	36	60.0	6	37.5	0	0.0	$X^2=3.8$	0.2		
	24	40.0	10	62.5	1	100				
-Breastfed infants • Correct (with solid food) • Incorrect	21	35.0	4	25.0	0	0.0	$X^2=1$	0.6		
	39	65.0	12	75.0	1	100				
-Non-Breastfed infants • Correct (at 0 day) • Incorrect	16	26.7	4	25.0	1	100	$X^2=2.7$	0.3		
	44	73.3	12	75.0	0	0.0				

$P \leq 0.05$ statistically significant

This table shows that there difference between three wasn't statistically significant hospitals.

Table (6): Background characteristics of the participating Physicians and Nurses

Healthcare workers Items	Physicians 187		Nurses 77		Significant test	p.value
Age (range) mean (years) ± (SD)	27-59 33.4± 7.2		21-53 30.4± 7.7		t test = 3.9	0.001*
Sex	No.	%	No.	%	X ² =14.8	0.000*
• Male	72	38.5	11	14.3		
• Female	115	61.5	66	85.7		
Duration of experience in pediatric field	1-30 144.5		1-35 103.3		Mann- Whitney U test=50	0.000*
Had previous training workshops in complementary feeding	No.	%	No.	%	X ² =1.2	0.3
• Yes	143	76.5	54	70.1		
• No	44	23.5	23	29.9		
Exclusive breastfeeding duration					X ² =39.6	0.000*
• Four months	38	20.3	4	5.2		
• Six months	144	77.0	53	68.8		
• ^a Other	5	2.7	20	26.0		
Appropriate time of introduction solid food					X ² =39.6	0.000*
• Four months	38	20.3	4	5.2		
• Six months	144	77.0	53	68.8		
• ^b Other	5	2.7	20	26.0		
Advisable first food					X ² =4.3	0.04*
• Iron fortified food	99	52.9	30	39.0		
• Vegetables& Fruits	88	47.1	47	61.0		
Whole cow milk introduction					X ² =0.7	0.7
• 6 months	4	2.1	3	3.9		
• 9 months	24	12.8	9	11.7		
• Above one year	159	85.1	65	84.4		
Yogurt and dairy product introduction					X ² =11	0.004*
• 6 months	77	41.2	19	24.7		
• 9 months	94	50.3	42	54.5		
• One year	16	8.5	16	20.8		
^c Honey introduction					X ² =1	0.3
• Correct (at 9month)	25	13.4	14	18.2		
• Incorrect	162	86.6	63	81.8		
Fruit juice can be given to infant below one year					X ² =0.5	0.5
• Yes	118	63.1	52	67.5		
• No	52	36.9	25	32.5		
6- 12months old infants					X ² =4.6	0.1
• 0-1 meal/day	4	2.1	5	6.5		
• 2-3 meals/day	152	81.3	55	71.4		
• ^a Other	31	16.6	17	22.1		

12-24months old infants						
• 1-2 meals/day	0	0.0	3	3.9	$\chi^2=9.9$	0.007*
• 3-4 meals/day	126	68.4	42	54.5		
• ^b Other	61	31.6	32	41.6		
-Breastfed infant					$\chi^2=17$	0.001*
• Since birth	11	5.9	6	7.8		
• 6 months	69	36.9	39	50.6		
• With solid	104	55.6	25	32.5		
• others	3	1.6	7	9.1		
-Non-Breastfed infant					$\chi^2=28$	0.000*
• Since birth	83	44.4	21	27.2		
• 4 months	89	47.6	30	39.0		
• 6 months	15	8.0	26	33.8		
• others	-	-	-	-		

$P \leq 0.05$ statistically significant

This table shows that there was statistically significant difference between three hospitals except previous training workshop, cow milk

introduction, Honey introduction, Fruit juice introduction and frequency meal 6-12 months old infants.

DISCUSSION

Complementary feeding is the process of giving young children foods other than breast - or formula - milk. Complementary foods should be introduced when exclusive breast- or formula- milk feeding becomes insufficient for growing infants to meet their nutritional requirements (Dembiniski et al., 2021).

The health and well-being of the child depends on the attainment of appropriate nutritional requirements which include breast or formula feeding followed by appropriate CF (Nathan et al., 2020).

In Egypt, most health surveys showed that considerable

percentage of children aged 6-23 months were suffering from stunting, PEM and micronutrients deficiencies especially iron, vitamin A and D (Amr et al; Hamid et al; Sheta et al and Elsedfy et al 2012). This may be due to lack of nutrition guidelines specially for CF, socioeconomic and cultural factors.

Although different international guidelines for CF-practices have been released over years (Szajewska et al., 2016). However, parents' dietary practices deviate greatly from these guidelines (Chourqui et al., 2013; Russel et al., 2016). This led to development of Egyptian clinical practice guidelines for CF

in 2018 in order to increase awareness of health care providers about CF, so they can import the same to mothers.

The aim of the present study was to assess the current awareness of pediatric health care providers regarding complementary feeding practices at Anfoshy hospital, Fawzy Moaz hospital and Ras-El Teen, all in Alexandria governorate in order to put a plan for application of the optimal complementary feeding practices as recommended by the recent evidence based Egyptian guidelines 2018.

It was a cross sectional study that included 246 health care providers, 187 Physicians with a mean age 33.4 ± 7.2 years and 77 nurses with mean age 30.4 ± 7.7 years.

Regarding physicians included in the present study, more than half of them were from Anfoshy hospital 66.8% with mean age 34.5 ± 7.6 , followed by physicians at Ras-El Teen hospital 17.1% with mean age 32.4 ± 4.8 and lastly Fawzy Moaz hospital 16.1% with mean age of 35.5 ± 7.8 .

Regarding the sex of physicians in our study, females were more than males with statistically significant difference.

As regard nurses included in our study, females also represented the majority of the sample.

In the current study, there was wide range of variation in the duration of experience among physicians at these hospitals with statistically significant difference, the highest mean rank was for Physicians in Fawzy Moaz hospital (122.4) followed by Anfoshy hospital (90.4) and lastly at Ras-El Teen hospital (81.5).

Also, there was variation of experience among nurses in the studied hospitals with statistically insignificant difference.

According to attendance of workshops it was noticed that the highest percentage of Physicians who attended workshops was at Fawzy Moaz hospital (83.3%), Anfoshy hospital (80.0%) and Ras-El Teen hospital (56.2%), the difference was statistically significant.

Regarding the questions of duration of exclusive breastfeeding for the first six months and introduction of solid food in our study, we found that 81.2% of Physicians at Ras-El Teen hospital agreed with **WHO, (2003)** followed by 80.0% at Anfoshy and 60.0% at Fawzy Moaz hospital.

Regarding to nurses' answers of this questions, (duration of exclusive breastfeeding for the first six months and introduction of solid food) in our study, the percentage was 100% at Fawzy Moaz hospital, 81.2% at Ras-El Teen hospital and 65.0% at Anfoshy hospital.

Supporting our physicians' results (**Weshahy et al 2019**). studied knowledge, attitude and practice among medical staff towards breastfeeding and reported that 92% of Physicians agreed that exclusive breast feeding is the most beneficial form of infant feeding for the first six months of life. Also, in the study of Hellings and Howe 2000 who assessed breastfeeding knowledge of practitioners, 100% agreed that exclusive breast feeding is the most beneficial form of infant feeding for the first six months of life.

In agreement of our nurses' results, (**Brahmanker et al 2019**) studied knowledge and attitude of nursing staff about complementary feeding practices and found that 98% of nurses recommended breast feeding for 6months.

The Egyptian guidelines 2018 has adopted **WHO recommendation (2003)** that exclusive breastfeeding should be promoted for at least 6 months.

For optimal growth of infants, the world health organization/ UNICEF recommend exclusive breast feeding for the first six months and the introduction of complementary feeding at age of six months (**WHO, 2018; UNICEF et al., 2011**).

The American Academy of pediatrics recommends the introduction of solid foods between 4 to 6months of age (**AAP 2016**).

ESPGHAN 2017 recommendations is to start CF not earlier than 17 weeks and not later than 26 weeks.

Egyptian guidelines in 2018, had adopted **WHO 2003** recommendations about introduction of complementary feeding at age of 6 months for exclusively breastfed infants, but for formula fed infants, ESPGHAN recommendation (25) to start Complementary feeding not earlier than 17 weeks and not later than 26 weeks has been adopted.

As regard the type of first complementary food to be introduced, we found lack of knowledge at all studied hospitals between Physicians about the best food to be introduced as recommended in Egyptian guidelines which is iron fortified cereals, the highest percentage

was at Anfoshy hospital (55.2%) followed by Fawzy Moaz hospital (50%) finally at Ras-El Teen hospital (46.9%).

On reviewing the answer of this same question among studied nurses, we found at Anfoshy hospital (40%), followed by Ras-El Teen hospital (37.5%) while no one answered correctly at Fawzy Moaz hospital.

Chouraqui et al 2019, who studied the order of complementary food introduction to infants in mainland, France, found that cooked vegetables were the first category introduced (76%) followed by cooked fruits (5.6%) or both (14.8%) and infant's cereals were recommended only in (1.5%) of cases.

Australian guidelines 2013, reported that in order to prevent iron deficiency, iron containing nutritious foods are the first recommended foods to be introduced.

Given the high prevalence of iron deficiency anemia among Egyptian children, estimated to be 29.9% in preschool children by **WHO in (2014)**; **Egyptian guidelines (2018)** recommended that the first food to be introduced is iron fortified cereals and iron nutritious foods.

In the present study, regarding the question of whole cow's milk introduction, 93.3% of Physicians at Fawzy Moaz hospital advised cow's milk after 1 year, followed by 84.8% at Anfoshy hospital and 78.1% at Ras-El Teen hospital.

While in nurses, the order of introduction of cow's milk after 1 year was (100%), (87.5%) and (83.3%) at Fawzy Moaz hospital, Ras-El Teen hospital and Anfoshy hospital respectively. In **Brahmanker et al. 2019**, only 1% of nurses advised cow's milk below one year.

Cow's milk is a poor iron source and when consumed in large amounts provides an excess of protein, fat, and energy. So high intake of cow's milk during the complementary feeding period can increase the risk of iron deficiency anemia as well as the onset of obesity. Therefore, the consumption of cow's milk is generally not recommended during the first year of life.

In the present study, review of complementary feeding practices regarding the question of advising yogurt and dairy products at sixth months revealed that Physicians at Ras-El Teen hospital (43.8%), Anfoshy hospital (43.2%) and Fawzy Moaz hospital (30%).

While the percentage of nurses who advised yoghurt and dairy

products at sixth months was highest at Ras-El Teen hospital (43.8%), Anfoshy hospital (20%) and Fawzy Moaz hospital (0.0%).

With the exception of liquid cow milk, which is not recommended before 12 months of age, WHO and Egyptian guidelines recommended giving whole cream dairy products as yogurt, cheese and pudding starting after 6 months (**WHO, 2003; Egyptian guidelines, 2018**).

Regarding honey introduction at the age of 9 months, we noticed that only (15.6%) of Physicians at Ras-El Teen hospital advised it correctly, followed by (13.3%) at Fawzy Moaz hospital and the least was at Anfoshy hospital (5.6%).

While the correct answers of this question among nurses were (100%), (18.8%) and (16.7%) at Fawzy Moaz hospital, Ras-El Teen hospital and Anfoshy hospital respectively.

As regards introduction of fruit juice after one year in our study, (43.8%) of physicians answered correctly (not before 1year) at El Ras-El Teen hospital followed by (36.8%) at Anfoshy hospital and (30%) at Fawzy Moaz hospital.

While the percentage of nurses who answered correctly regarding to this question was (36.7%) at

Anfoshy hospital, followed by (18.8%) at Ras-El Teen hospital while no one answered correctly at Fawzy Moaz hospital.

Egyptian guidelines 2018 recommended that fruit juice (including 100% homemade fruit juice) should not be offered to infants less than 12 months, instead, consumption of mashed whole fruits is suggested between 6-12 months, thus adopting **ESPGHAN 2017** recommendation.

In the present study, regarding the question of iron supplementation at sixth months of age, we found that physicians at Fawzy Moaz hospital had the highest percentage of correct answer (90.0%) followed by Physicians at Ras-El Teen hospital (81.2%) and the least was at Anfoshy hospital (73.6%),

On the other hand, the percentage of nurses included in our study who advised introduction of iron at sixth months was highest at Fawzy Moaz hospital (100%) followed by Ras-El Teen hospital (81.2%) and the least percentage was at Anfoshy hospital (55%).

This prevalence was lower than that reported in the study by Hassan et al. (32) in El-Menoufia, Egypt which showed that 57.1% of the studied children had IDA

and the highest percent was among infants (6 months -2 years).

According to **WHO 2016**, daily iron supplementation is recommended as a public health intervention in infants and young children aged 6-23 months, living in settings where anemia is highly prevalent, for preventing iron deficiency and anemia in a dose of 10-12.5 mg elemental iron for 3 consecutive months of year (34). Being a highly prevalent area for IDA, Egyptian guidelines adopted this recommendation in **Egyptian guidelines, 2018**.

In our study, we found that the majority of Physicians and nurses who advised Vit D supplementation at 0 day.

In (2018), Egyptian guidelines has adopted AAP 2016, recommendations that all infants should be supplemented with vit D (400 IU) since birth, as our country is located in geographic distribution of vit D deficiency region (**Hussein et al and Holick et al 2013**).

Regarding to frequency of meals at age of 6-12 months we found that (83.3%) of Physicians at Fawzy Moaz hospital advised 2-3 meals, while (81.6%) and (78.1%) advised that at Anfoshy hospital and Ras-El Teen hospital respectively. At age of 12_24 months we found the percentage

of physician's correct answers was (73.3%) at Fawzy Maoz hospital followed by (67.2%) at Anfoshy hospital and the least percentage was at Ras-El Teen hospital (62.5), without statistically significant difference between hospitals.

In nurses also, we found most of them answered correctly regarding this question at age of 6-12 months, the highest percentage was at Fawzy Moaz hospital (100%) followed by Ras-El Teen hospital (93.8%) and at Anfoshy hospital it was (65%). But for the frequency of meals at 12- 24 months the highest percentage correct answer at Anfoshy hospital (60%) followed by Ras-El Teen hospital (37.5%) and no one answered correctly at Fawzy Moaz hospital.

For the average healthy infant, WHO 2003, recommended that meals of complementary foods should be provided 2-3 times per day at 6-8 months of age and 3-4 times per day at 9-11 and 12 -24 months of age, with additional nutritious snack (such as a piece of fruit or bread) offered 1-2 times per day, as desired (**Egyptian guidelines, 2018 And WHO 2003**).

Regarding the question of introduction of water with solid foods in breastfed infants among

Physicians, we found that (63.2%) at Anfoshy hospital answered correctly followed by Ras-El Teen hospital (50%) and the least percentage of correct answer at Fawzy Moaz hospital (30%).

On the other hand, for non-breastfed infants the correct time of introduction of water is since birth according to **WHO 2005**, and **Egyptian guidelines 2018**, we found (53.1%) of Physicians answered correctly at Ras-El Teen hospital followed by Physicians at Anfoshy hospital (43.2%) and the least percentage was at Fawzy Moaz hospital (40%).

While in nurses, the percentages of correct answers about water introduction in breastfed infants were (35%), (25%) and (0.0%) at Anfoshy hospital, Ras-El Teen hospital and Fawzy Moaz hospital respectively. In non-breastfed infants the highest percentage of correct answer was at Fawzy Moaz hospital (100%), followed by Anfoshy hospital (26.7%) the least percentage of correct answer (25%) at Ras-El Teen hospital.

Up to the age of 6 months, breastfed infants generally don't need any supplementary fluids, while formula fed infants may be offered cooled boiled water, this does not apply to breastfed infants, as offering other fluids may

interfere with the demand supply basis of milk production (**FSAI 2011**).

CONCLUSIONS

- The present study demonstrated that knowledge of the studied pediatric health care providers is not optimum in several aspects of complementary feeding.
- Regarding the comparison between Physicians and nurses, the percentage of correct answers among physicians was higher than nurses in most of questions with statistically differences.
- The main challenges in CF practices include time of honey introduction, time of introduction of yogurt and dairy products, fruit juice introduction, the advisable first food and water introduction in both breastfed and non-Breastfed infants respectively.

RECOMMENDATION

- Arrangement of regular training courses for pediatric health care provider about optimum CF practices (**as suggested by the recent Egyptian guidelines, (2018)**).
- Implantation of Egyptian CF guidelines booklet to all pediatric health care provider at all hospitals.

- Implantation tools that help to apply optimum CF practices to pediatric health care providers and also to parents (e.g. folders, flyers and posters).
- Regular follows up studies for reassessment of health care providers to ensure continued application of optimum CF practices.

LIMITATIONS

- Uncooperative physicians and nurses.
- Long duration to explain questionnaire.

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