COMMON PITFALLS REGARDING COMPLEMENTARY FEEDING PRACTICES AMONG HEALTH CARE PROVIDERS AT SOHAG GOVERNORATE

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 Shoag Governorate (Sohag General Hospital, Sohag Teaching Hospital, Elhelal Hospital and Gerga General Hospital) regarding complementary feeding practices.*

Patients and Methods: *This study is a comparative cross-sectional questionnaire-based study conducted among 234 health care providers (122 physicians and 112 nurses) working in pediatric departments of the above-mentioned hospitals in Sohag. 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 water introduction in breastfed infants (96.7%), honey introduction (92.6%), introduction of fruit juice (86%), advisable first food (64.8%), introduction of dairy products (59%), iron supplementation (59%) & water in non-breastfed infants (36.1%) 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)**.

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 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**; **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 at some Sohag hospitals (Sohag General Hospital, Sohag Teaching Hospital, Elhelal Hospital and Gerga General Hospital) regarding complementary feeding practices.

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.
- Confidentially 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 puplication.

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

Sample size:

The studied sample included two hundred thirty-four healthcare workers, 122 physicians with a mean age 35.8± 9.3 years and 112 nurses with a mean age 26.5±6.9 years. They were randomly selected from Sohag General Hospital (SGH), Sohag teaching hospital (STH), Elhelal hospital and Gerga general hospital (GGH) at Sohag governorate.

Inclusion Criteria of health care providers: Egyptian pediatrician and nurses working in pediatric departments of the previously mentioned hospitals and willing to participate.

Exclusion Criteria: other Specialists and general practitioners.

Study setting: The study was conducted at all pediatric wards inpatient and outpatient of Sohag General Hospital (SGH), Gerga general hospital (GGH) both belong to Ministry of Health, Sohag teaching hospital (STH) that belongs to the general organization for teaching hospitals and institutes, and ElHelal hospital which belongs to the health insurance hospitals.

Subjects: all health care providers (physicians and nurses) that care for neonates, infants, children, were recruited from pediatric units of the previously mentioned hospitals. The total number of possible participants in the designated hospitals during the time of the study was 168 physicians, 130 nurses. They were chosen every other day using simple randomization and after

receiving approval from the ethical committee of Al-Azhar University, a total sample of 234 of health care providers (78.5% of the total number) were completed from the previously mentioned hospitals during the period from September 2019 to September 2020.

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 &

nonbreast 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)**.
- 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.

Statistical Analysis:

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, mann-Whitney U test between two groups of non-normally distributed data and pearson Chi square test used for qualitative data.

1. The value of significance was taken at (p-value ≤ 0.05).

2. The results presented in tables and figures.

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

RESULTS

The results of the current study are arranged into the following sections:

- **Section (1):** Characteristics of physicians in the studied hospitals.
- **Section (2):** Characteristics of nurses in the studied hospitals.
- **Section (3):** Comparison between physicians and nurses in the studied hospitals.

Table (1): Knowledge of physicians about breastfeeding and complementary feeding

Items \ Place of work	Sohag general hospital (SGH) (59)		Sohag teaching hospital (STH) (21)		Elhelal hospital (20)		Gerga general hospital (GGH) (22)		Sig. test	*p.*
	No.	%	No.	%	No	%	No.	%		
Exclusive breast-feeding duration										
•Correct (6 m)	**45**	**76.3**	**13**	**61.9**	**13**	**65.0**	**22**	**100**	X^2=10.6	
•Incorrect	14	23.7	8	38.1	7	35.0	0	0.0		**0.014***
Appropriate time of introduction of solid food										
•Correct (at 6ms)	**38**	**64.4**	**15**	**71.4**	**18**	**90.0**	**21**	**95.5**	X^2=11	**0.011***
•Incorrect	21	35.6	6	28.6	2	10.0	1	4.5		
Advisable first food										
•Correct	**31**	**52.5**	**7**	**33.3**	**5**	**25.0**	**0**	**0.0**	X^2=20.6	**0.000***
•Incorrect	28	47.5	14	66.7	15	75.0	22	100		
Whole cow milk introduction										
•Correct (after 1year)	**58**	**98.3**	**16**	**76.2**	**20**	**100.0**	**15**	**68.2**	X^2=**21.**527	**0.000***
•Incorrect	1	1.7	5	23.8	0	0.0	7	31.8		
Yogurt and dairy product introduction										
•Correct (at 6ms)	**20**	**33.9**	**1**	**4.8**	**7**	**35.0**	**22**	**100**	X^2=**44**	**0.000***
•Incorrect	39	66.1	20	95.2	13	65.0	0	0.0		
Honey can be given to infant below one year?										
•Correct (at 9ms)	**9**	**15.3**	**0**	**0.0**	**0**	**0.0 3**	**0** 22	**0.0** 100.0	X^2=**10.4**	**0.016***
•Incorrect	50	84.7	21	100.0	20	100.0				
Fruit juice introduction										
•Correct (after year)	**11**	**19.0**	**0**	**0.0**	**4**	**20.0**	**2**	**9.1**	X2=5.6	0.1
•Incorrect	47	81.0	21	100	16	80.0	20	90.9		

P≤0.05, statistically significant

The previous table shows that there was statistically significant difference at all items about complementary feeding (between physicians) except for time of fruit juice introduction.

Table (1): Knowledge of physicians about iron and Vitamin D supplementations, frequency of meals and time of water introduction

Place of work / Items	Sohag general hospital (SGH)(59)		Sohag teaching hospital (STH)(21)		Elhelal hospital (20)		Gerga general hospital (GGH)(22)		Sig. test	*p.*
	No.	%	No.	%	No.	%	No.	%		
Appropriate time of Iron										
•Correct (at 6 ms)	**27**	**45.8**	**13**	**61.9**	**3**	**15.0**	**7**	**31.8**	X^2=10.7	**0.013***
•Incorrect	32	54.2	8	38.1	17	85.0	15	68.2		
Appropriate time of Vitamin D										
•Correct (at 0 day)	**58**	**98.3**	**21**	**100**	**20**	**100**	**22**	**100**	X^2=1	0.8
•Incorrect	1	1.7	0	0.0	0	0.0	0	0.0		
6-12months old infants										
•Correct(2-3meals/day)	**55**	**93.2**	**21**	**100**	**19**	**95.0**	**22**	**100**	X^2=3	0.4
•Incorrect	4	6.8	0	0.0	1	5.0	0	0.0		
12-24months old infants										
•Correct(3-4meals/day)	**55**	**93.2**	**21**	**100**	**19**	**95.0**	**21**	**95.5**	X^2=1.5	0.7
•Incorrect	4	6.8	0	0.0	1	5.0	1	4.5		
-Breastfed infants										
•Correct	**3**	**5.1**	**0**	**0.0**	**1**	**5.0**	**0**	**0.0**	X^2=2.3	0.5
•Incorrect	56	94.9	21	100	19	95.0	22	100		
-Non Breastfed infants										
•Correct	**31**	**52.5**	**14**	**66.7**	**11**	**55.0**	**22**	**100**	X^2=16	**0.001***
•Incorrect	28	47.5	7	33.3	9	45.0	0	0.0		

P≤0.05, statistically significant

This table shows that there wasn't statistically significant difference except for time of introduction of introduction of iron and water in non-breastfeed infonts.

Table (2): Knowledge of Nurses about breastfeeding and complementary feeding

Items \ Place of work	Sohag general hospital (SGH) (40)		Sohag teaching hospital (STH)(34)		Elhelal hospital (32)		Gerga general hospital (GGH)(6)		Sig. test	*p.*
	No.	%	No.	%	No.	%	No.	%		
Exclusive breast feeding duration										
•Correct (6 ms)	**38**	**95.0**	**34**	**100**	**31**	**96.9**	**6**	**100**	X^2=2	0.6
•Incorrect	2	5.0	0	0.0	1	3.1	0	0.0		
Appropriate time of Introduction of solid food										
•Correct (at 6 ms)	**38**	**95.0**	**28**	**82.4**	**29**	**90.6**	**4**	**66.7**	X^2=5.8	0.1
•Incorrect	2	5.0	6	17.6	3	9.4	0	33.3		
Advisable first food										
•Correct	**4**	**10.0**	**2**	**5.9**	**16**	**50.0**	**2**	**33.3**	X^2=24	**0.000***
•Incorrect	36	90.0	32	94.1	16	50.0	4	66.7		
Whole cow milk introduction										
•Correct (after 1 year)	**28**	**70.0**	**30**	**88.2**	**29**	**90.6**	**4**	**66.7**	**X^2=7.096**	**0.069***
•Incorrect	12	30.0	4	11.8	3	9.4	2	33.3		
Yogurt and dairy product introduction										
•Correct (at 6 ms)	**30**	**75.0**	**18**	**53.9**	**11**	**34.4**	**5**	**83.3**	X^2=14	**0.003***
•Incorrect	16	25.0	16	46.1	21	65.6	1	16.7		
Honey can be given to infant below one year										
•Correct (at 9 ms)	**8**	**20.0**	**5**	**14.7**	**2**	**6.2**	**1**	**16.7**	**X^2=2.787**	0.426
•Incorrect	32	80.0	29	85.3	30	93.8	5	83.3		
Fruit juice introduction										
•Correct (after 1year)	**15**	**37.5**	**2**	**5.9**	**2**	**6.2**	**2**	**33.3**	X^2=17	**0.00***
•Incorrect	25	62.5	32	94.1	30	93.8	4	66.7		

* $p \leq 05$, statistically significant.

This table shows statistically significant difference among nurses about items of complementary feeding except for time of exclusive breastfeeding. Appropriate time of introduction of solid foods and honey.

Table (3): Knowledge of Nurses about iron and Vitamin D supplementations, frequency of meals and time of water introduction

Items \ Place of work	Sohag general hospital (SGH) (40)		Sohag teaching hospital (STH)(34)		Elhelal hospital (32)		Gerga general hospital (GGH)(6)		Sig. test	*p.*
	No.	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**		
Appropriate time of Iron										
•Correct (at 6ms)	**12**	**30.0**	**4**	**11.8**	**14**	**43.8**	**3**	**50.0**	X^2=9.4	**0.023***
•Incorrect	28	70.0	30	88.2	18	56.2	3	50.0		
Appropriate time of Vitamin D										
•Correct (at 0 day)	**33**	**82.5**	**16**	**47.1**	**27**	**84.4**	**4**	**66.7**	X^2=15	**0.002***
•Incorrect	7	17.5	18	52.9	5	15.6	2	33.3		
6- 12months old infants										
•Correct(2-3meals/day)	**29**	**72.5**	**32**	**94.1**	**30**	**93.8**	**6**	**100**	X^2=11	**0.013***
•Incorrect	11	27.5	2	5.9	2	6.2	0	0.0		
12-24months old infants										
•Correct (3-4meals /day)	**29**	**72.5**	**32**	**94.1**	**31**	**96.9**	**5**	**83.3**	X^2=15	**0.012***
•Incorrect	11	27.5	2	5.9	5	3.1	1	16.7		
-Breastfed infants										
•Correct	**3**	**7.5**	**6**	**17.6**	**11**	**34.4**	**4**	**66.7**	X^2=15	**0.002***
•Incorrect	27	92.5	28	82.4	21	65.6	2	33.3		
-Non Breastfed infants										
•Correct	**22**	**55.0**	**19**	**55.9**	**11**	**34.4**	**0**	**0.0**	X^2=9.5	**0.024***
•Incorrect	18	45.0	15	44.1	21	65.6	6	100		

* $p \leq 0.05$, statistically significant.

The previous table shows that there was statistically significant difference at all the above points.

Table (4): Comparison between Physicians and nurses as regards breastfeeding and complementary feeding knowledge

Healthcare workers / Items	Physicians 122		Nurses 112		Significant test	p.value
	No.	%	No.	%		
Exclusive breast-feeding duration						
•Four months	29	23.8	3	2.7	X^2=22	**0.000***
•Six months	**93**	**76.2**	**109**	**97.3**		
Appropriate time of Introduction of solid food						
•4 months	8	6.6	4	3.6	X^2=9	**0.023***
•5 months	13	10.6	2	1.8		
•6 months	**92**	**75.4**	**99**	**88.4**		
•[a]Other	9	7.4	7	6.2		
Advisable first food						
•Iron fortified food	**43**	**35.2**	**24**	**21.4**		
•Vegetables& Fruits	52	42.6	29	25.9	X^2=23	**0.000***
•Yogurt &dairy products	27	22.2	59	52.7		
Whole cow milk introduction						
•6 months	3	2.4	12	10.8		
•9 months	10	8.2	9	8.0		
•Above one year	**109**	**89.3**	**91**	**81.2**	X^2=6.657	**0.036**
Yogurt and dairy product introduction						
•6 months	**50**	**41.0**	**64**	**57.1**		
•9 months	40	32.8	6	5.4	X^2=28	**0.000***
•One year	30	24.6	41	36.6		
•[b]Other	2	1.6	1	0.9		
[C]Honey introduction						
•Correct (at 9 ms)	**9**	**7.4**	**16**	**14.3**		
•Incorrect	113	92.6	96	85.7	X^2=2.921	**0.087**
Fruit juice can be given to infant below one year					X^2=0.9	0.3
•Yes	104	86.0	91	81.2		
•No	**17**	**14.0**	**21**	**18.8**		

* $p \leq 0.05$, statistically significant.

aOther for physicians 7 mentioned at 8 months and 2 at 9 months while nurses 5 mentioned at 8 months and 2 at 9 months bother for physicians they mentioned at 8 months while nurses mentioned at 18 months.

cHoney: for physicians 9 mentioned at 9 months,2 at 8 months, 2 at 6 months and 2 since birth or first month. While nurses 16 mentioned at 9 months, 3 at 8 months, 22 at 6 months, 1 at 5m, 3 at 4 m and 2 since birth.

This table shows that there was statistically significant difference between physicians and nurses about items of complementary feeding except for time of cow's milk, honey and fruit juice introduction.

Table (5): Comparison between Physicians and nurses as regards time of iron and Vitamin D supplementation, frequency of meals and time of water introduction

Healthcare workers / Items	Physicians 122		Nurses 112		Significant test	p.value
	No.	%	No.	%		
Appropriate time of Iron						
•4 months	68	55.7	53	47.3		
•6 months	**50**	**41.0**	**33**	**29.5**	X^2=23	**0.000***
•10 months	0	0.0	16	14.3		
•[a]Other	4	3.3	10	8.9		
Appropriated time of Vitamin D						
•Since birth	**121**	**99.2**	**80**	**71.4**		
•4 months	0	0.0	19	17.0	X^2=37	**0.000***
•6 months	1	0.8	13	11.6		
6- 12months old infants						
•0-1 meal/day	4	3.3	6	5.4		
•2-3 meals/day	**117**	**95.9**	**97**	**86.6**	X^2=8	**0.017***
•[a]Other	1	0.8	9	8.0		
12-24months old infants						
•1-2 meals/day	1	0.8	0	0.0		
•3-4 meals/day	**116**	**95.1**	**97**	**86.6**	X^2=7.3	**0.026***
•[b]Other	5	4.1	15	13.4		
-Breastfed infants						
•Since birth	46	37.7	39	34.8		
•6 months	71	58.2	46	41.1		
•8 months	1	0.8	3	2.7	X^2=20.8	**0.000***
•With solids	**4**	**3.3**	**24**	**21.4**		
-Non Breastfed infants						
•Since birth	**78**	**63.9**	**52**	**46.4**		**0.027***
•4 months	23	18.9	32	28.6	X^2=7.3	
•6months	21	17.2	28	25.0		

* $p \leq 05$, statistically significant.
aOther for physicians 1 mentioned 4meals/day while nurses 8 mentioned 4meals/day and 1 mentioned 5 meals/day
bOther for physicians 4mentioned 5meals/day and 1 mentioned 6meals/day while nurses 12 mentioned 5meals/day and 3 mentioned 6 meals/day

The previous table shows there was statistically significant difference at all the above points.

DISCUSSION

Complementary feeding (CF) 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 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)*.

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.

This is a cross sectional study that included health care providers,122 Physicians with a mean age 35.8 ±9.3 years and112 nurses with a mean age 26.6±6.5years.

Regarding the question of duration of exclusive breastfeeding for the first six months in our study, we found that 100% of Physicians at GGH agreed with *WHO (2003)*, recommendations of exclusive breastfeeding for 6 months followed by 76.3% at SGH then 65% at Elhelal hospital and lastly 61.9% at STH. This means that most of physicians recommended exclusive breastfeeding for the first six months. However, the difference between physicians in different hospitals may be related to the wide range of variation in the duration of experience and the attendance of training workshops in CF at these hospitals being highest for physicians at GGH.

Regarding to nurses answer of this same question, nearly all nurses in our study recommended breastfeeding for six months, the percentage was 100% at STH and GGH, then 96.9% at Elhelal hospital and 95% at SGH.

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.

As regards the appropriate age of introduction of solid foods in the present study, we found that most of physicians recommended solid food introduction at sixth months of life, the highest percentage was at GGH (95.5%)

followed by Elhelal hospital (90%) then at STH (71.4%) and finally at SGH (64.4%).

The percentage of nurses who answered correctly about the time of introduction of solid foods was 95%, 90.6%,82.4%, and 66.7% at SGH, Elhelal hospital, STH and GGH respectively. In the study of *Brahmanker et al. (2019)*, 72% of nurses knew about the correct age of initiation of complementary feeding at six months.

Many depates have ensued about the appropriate time to introduce solid foods to infants *(Chouraqui et al., 2019)*.

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)*.

As regard the type of first complementary food to be introduced, we found lack of awareness in 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 SGH (52.5%) followed by STH (33.3%) then at Elhelal hospital (25%) and finally at GGH (0%).

On reviewing the answer of this same question among studied nurses, we found that the highest percentage of correct answer among them was at Elhelal hospital (50%), followed by GGH (33.3%) then SGH (10%) and the least percentage was at STH (5.9%).

Australian infant feeding 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, 100% of physicians at Elhelal hospital advised cow's milk after 1year, followed by 98.3% at SGH then 76.2% at STH and the least percentage was 68.2% at GGH. This means that more than half of Physicians in all hospitals included in our study correctly advised cow's milk after 1 year of age.

While in nurses, the percentage who advised introduction of cow's

milk after 1year was (90.6%), (88.2%), (70%) and (66.7%) at Elhelal hospital, STH, SGH and GGH respectively. In *Brahmanker et al. (2019)*, only 1% of nurses advised cow's milk below one year.

In the present study, review of CF practices regarding the question of advising yogurt and dairy products at sixth months revealed that physicians at GGH recorded the highest percentage of correct answer (100%), (that agreed with WHO and Egyptian guidelines) followed by Physicians at Elhelal hospital (35%) then Physicians at SGH (33.9%) and the least percentage was at STH (4.8%).

While the percentage of nurses who advised yoghurt and dairy products at sixth months was highest at GGH (83.3%) followed by SGH (75%) then STH (53.9%) and the least percentage was at Elhelal hospital 34.4%.

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 yougurt, cheese and pudding starting after 6 months *(WHO, 2010*; *Egyptian guideline, 2018).*

Regarding honey introduction at the age of nine months, we noticed that only 15.3% of Physicians at SGH who answered correctly and no one in the remaining hospitals advised that.

While the correct answers of this question among nurses were (20%), (16.7%), (14.7%) and (6.2%) at SGH, GGH, STH and Elhelal hospital respectively who advised honey below one year of age.

Based on available evidence in Egyptian population the committee suggests honey introduction in small amounts starting from 9 months *(Egyptian guideline, 2018).*

As regards introduction of fruit juice after one year in our study, only (20%) of physicians answered correctly (not before 1year) at El helal hospital followed by 19% at SGH then 9% at GGH and no one answered correctly at STH.

While the percentage of nurses who answered correctly regarding to this question was (37.5%) at SGH, followed by (33.3%) at GGH, then (6.2%) at Elhelal hospital and the least percentage was at STH (5.9%).

Energy providing liquids (fruit juices, vegetable fruits, soda pops and organic products drinks) are not beneficial for babies in their early life as it provides only

minimal amount of nutrients and they replace other food sources that can give nutrition *(AAP, 2016*; *Zigler, 2011)*.

In the present study, regarding the question of iron supplementation at sixth months of age, we found that physicians at STH had the highest percentage of correct answer (61.9%) followed by Physicians at SGH (45.8%) then GGH (31.8%) and the least was at Elhelal hospital (15%).

On the other hand, the percentage of nurses included in our study who advised introduction of iron at sixth months was highest at GGH (50%) followed by Elhelal hospital (43.8%) then SGH (30%) and the least percentage was at STH (11.8%).

Again in Egyptian study by *Soliman et al. (2020)* in Assiut city conducted on infants (12-24 months) showed a high prevalence of IDA, 41.6% of the study population.

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 anaemia is highly prevalent, for preventing iron deficiency and anaemia in a dose of 10-12.5 mg elemental iron for 3 consecutive months of year *(WHO, 2015)*. Being a highly prevalent areas for iron deficiency anemia Egyptian guidelines adopted these recommendations in *(WHO, 2018)*.

In our study, we found that nearly all Physicians in all hospitals recommended introduction of vit D from 0 day, this question had the highest correct answer among physicians.

Regarding to nurses in our study who answered correctly about vit D supplementation from birth, we found that the highest percentage was at Elhelal helal hospital (84.4%,) followed by SGH (82.5%) then GGH (66.7%) and the least percentage was at STH (47.1%).

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 vitamin D deficiency region *(Hussein-Nezhad and Holick, 2013)*.

Regarding to daily frequency of meals at age of 6-12 months we found that 100% of Physicians at GGH and STH advised 2-3 meals, while 95% and 93.2% advised that at Elhelal hospital and SGH respectively. At age of 12_24 months we noticed the same order of correct answer without

statistically significant difference between hospitals.

In nurses also, we found that most of them answered correctly regarding this question at age of 6-12 months, the highest percentage was at GGH (100%) followed by STH (94.1%), then at Elhelal hospital (93.8%) and at SGH was (72.5%). But for the frequency of meals at 12- 24 months, the highest percentage of correct answer was at Elhelal hospital (96.9%) followed by STH (94.1%), then GGH (83.3)% and the least percentage was at SGH (72.5%).

For the average healthy infant, WHO 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 *(WHO, 2010*; *Egyptian guideline, 2018).*

Regarding the question of introduction of water with solid foods in breastfed infants among Physicians, we found that only 5% in SGH and Elhelal hospital answered correctly and no one answered correctly in GGH and STH, this is the question of least percentage of correct answer.

On the other hand, for non-breastfed infants the correct time of introduction of water is since birth according to *WHO (2005)*; *Egyptian guidelines (2018)*. We found all Physicians answered correctly at GGH (100%) followed by Physicians at STH (66.7%) then in Elhelal hospital (55%) and the least percentage was at SGH (52.5%).

While in nurses, the percentages of correct answer about water introduction in breastfed infants were (66.7%), (34.4%), (17.6%) and (7.5%) at GGH, Elhelal hospital, STH and SGH respectively. In non-breastfed infants the highest percentage of correct answer was in STH (55.9%) followed by SGH (55%) then Elhelal hospital (34.4%) and no correct answers at GGH.

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 *(Food Safety Authority of Ireland, 2011).*

Australian infant feeding guidelines (2013) also recommended that exclusively breastfed infants don't require

additional fluids up to 6 months of age.

In comparison between physicians and nurses in our study, we found that Physicians represent 52.1% of the studied sample and nurses represent the remaining 47.9%.

Regarding the question of duration of exclusive breast feeding, the percentage of Physicians who answered correctly for six months was (76.2%) which was less than nurses (97.3%). Also, the percentage of nurses who answered correctly regarding the question of solid food introduction at sixth months was 88.4% that was higher than Physicians (75.4%).

The percentage of Physicians who advised iron fortified cereals to be the first food introduced was higher than nurses (35.2% versus 21.4%) respectively. Also, the percentage of Physicians who advised whole cow's milk after 1year of age was higher than nurses (89.3% versus 81.2%) respectively.

Regarding yogurt and dairy products introduction at 6 months, the percentage of nurses who answered correctly was more than Physicians (57.1% versus 41% respectively).

The percentage of nurses who advised introduction of honey at nine months was more than physicians (14.3% versus 7.4%) respectively.

On review of the question of fruit juice introduction after 1year of age which is the correct answer according to *ESPGHAN (2017)*; *Egyptian guidelines (2018)*, the percentage of nurses was higher than Physicians (18.8% versus 14%) respectively.

All the previous results showed statistically significant difference between Physicians and nurses except for the question of fruit juice introduction.

Regarding the question of iron and vitamin D supplementation, we found that 41% of Physicians answered correctly regarding iron supplementation at 6 months compared to 29.5% of nurses. The percentage of Physicians who advised vit D introduction at 0 day was 99.2%, while in nurses it was 71.4%, both with statistically significant difference.

The percentage of Physicians who advised the appropriate daily number of meals at 6-12 months was (95.5%) compared to (86.6%) of nurses. Also, the percentage of Physicians who advised the correct daily number of meals at 12-24 months was higher than nurses (95.1% versus 86.6%

respectively) with statistically significant difference.

In agreement with our study, *Nsaih-Asamouh (2018)* in Ghana studied knowledge of health worker in CF and found that: The majority (82.3%) of the health care workers knew the recommended daily feeding frequency for breastfeeding children aged between 6 and 8 months, (81.3%) also knew the recommended feeding frequency (9-24months) age group However, only 6.8% of the health care workers knew that non-breastfeeding children aged between 6 and 23 months should be fed 4 or more times daily. Again, only 9.9% of the health care workers knew that non-breastfed children age 6-23 months should receive milk or milk products two or more times a day to ensure that their calcium needs are met.

Regarding the question of introduction of water with solid foods for breastfed infants, only 3.3% of Physicians advised that compared to 21.4% of nurses who advised that, while in non-breastfed infants, the percentage of Physicians who answered correctly at 0 day was more than nurses (63.9% versus 46.4% respectively), with statistically significant difference.

Early introduction of water for breastfed infants is common malpractices in complementary feeding, *(Gupta et al., 2007)* who studied effect of early introduction of water and CF in northern Senegal and found that; water was introduced to about 85% of children in the first 3 month of life.

In the present study, we noticed poor knowledge of Physicians and nurses regarding several aspects of CF practices that need to be updated and enhanced by continued nutritional education programs.

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.

CONCLUSIONS

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.

RECOMMENDATION

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.

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