

## Effect of Toddlers' Feeding before Abdominal Operations on Postoperative Complications

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### ABSTRACT

Toddlers are required to be fasting before general anaesthesia with the aim of reducing the volume and acidity of their stomach contents. It is thought that fasting reduces the risk of regurgitation and aspiration of gastric contents during surgery. The stomach is not emptied of liquids and solids in the same way, and therefore preoperative fasting should not be the same for both. Human milk leaves the stomach more rapidly than artificial milk, and the emptying of non-human milk is similar to that of solids. **This study aimed** to determine the effects of toddlers' feeding (clear fluid, breast milk, formula milk and adult food) before abdominal operations on postoperative complications and to improve nurses' knowledge about pre and post-operative care especially preoperative fasting and immediate post-operative complications. A Comparative descriptive research design was used to conduct the study in the pediatric surgical unit at Assiut university children Hospital. It included 100 children (25 children for each group) who were selected randomly, aged from 1 to 3 years. One tool was used for collecting data in this study consist of three part; part (1); A structured interview questionnaire, it included personal and clinical data of children related to surgery, part (2) child's food consumption pattern and part three include Observation sheet to assess the postoperative complication. **The study results** revealed that, no one of breast milk and clear fluids feeding toddlers suffered from any immediate post-operative complications (aspiration, regurgitation and vomiting), will aspirated, regurgitated and vomited cases were found among toddlers received adult food higher than toddlers received artificial milk. **Conclusion:** Based on the results of the current study it was concluded that the toddlers received human milk and clear fluid have less immediate post-operative complications while the toddlers received adult food and artificial milk have higher percent of immediate post-operative complication. **Recommendations:** Organized an educational sessions for health staff worked in pediatric surgical hospital about correct method of toddlers' fasting preoperative (type of food and fasting time) to prevent immediate post-operative complications, recommended to do further researches in this field.

**Key words:** Feeding Types, Abdominal Operations, Perioperative Nursing Role, Postoperative Complications, fasting time and Toddler Stage.

### INTRODUCTION

Adolescence Pediatric fasting guidelines are intended to reduce the risk of pulmonary aspiration of gastric contents and

facilitate the safe and efficient conduct of anesthesia. Recent changes in these guidelines, while assuring appropriate levels of patient safety, have been directed at improving the overall perioperative

experience for infants, children, and their parents (Nicholson et al., 2013).

Recent developments have encouraged a shift from the standard 'nil-by-mouth-from-midnight' fasting policy to more relaxed regimens. The fear of aspiration of gastric contents and its life-threatening consequences in children (aspiration pneumonitis and respiratory failure), has caused many medical practitioners, particularly anaesthetists, to rigidly follow prolonged preoperative fasting standard (Oppeda et al., 2012).

This is the nil per oral (NPO) order for clear fluids/liquids and solids overnight or six to eight hours preceding the induction of anesthesia. This practice neither takes into account the differences in the rate of gastric emptying for solid food (which may exceed six hours) and clear liquids (which is one to two hours), nor the differences in scheduled times of surgery (Thomsen et al., 2014).

For children who are at risk of pulmonary aspiration or vomiting during anesthesia, there is no evidence showing that denying them oral liquids before surgery improves outcomes but there is evidence showing that giving liquids prevents anxiety (Sheffield et al., 2013).

Preoperative fasting is the practice of a children abstaining from oral food and fluid intake for a time before an operation is performed. This is intended to prevent pulmonary aspiration of stomach contents during general anesthesia (Bradt et al., 2013).

**According to Society British anesthetists (2013)** minimum fasting times prior to surgery have long been debated. The first proposition came from British anesthetists stating that children should be nil by mouth from midnight. The following are the recommended guidelines for nil by mouth prior to surgery in healthy children:

Ingested material	Minimum fasting period
Clear fluids	2 hours
Breast milk	4 hours
Artificial milk	6 hours
Nonhuman milk	6 hours
Light meal	6 hours

The aim of preoperative fasting is to prevent regurgitation and pulmonary aspiration while limiting potential problems of thirst, dehydration and hypoglycemia. The American Society of Anaesthesiologists (ASA) has suggested guidelines for preoperative fasting for children undergoing elective surgery (American Society of Anaesthesiologists, 2013).

In one study, of forty-three randomized controlled comparisons (from 23 trials) involving 2350 children considered to be at normal risk of regurgitation or aspiration during anaesthesia. Only one incidence of aspiration and regurgitation was reported. The children permitted to take fluids were also having less thirst and hunger, behaved better and were more comfortable than those who were fasting (Tanner et al., 2011).

In breast milk feeding, the amino acids (the building blocks of proteins) are well balanced for the human baby, as are the sugars (primarily lactose) and fats. The baby's intestinal tract is best aided by the vitamins, enzymes, and minerals found in breast milk. Breastfed babies do eat more often than formula fed babies since breast milk is more quickly digested and leaves the stomach empty more frequently (Labbok, 2010).

To improve these perioperative practices related to fasting and feeding, anaesthesiologists, surgeons and the nursing staff must work together. Increasing awareness needs to be created among them

about preoperative fasting and immediate post-operative complications (aspiration, regurgitation and vomiting) (Webster et al., 2012).

In the day prior to surgery, nurses must keep children's routine preoperative nursing care as; decrease stress by explaining procedure and fasting according to child's feeding habits and type of feeding and make sure that the children and their family are well oriented to operating room. Nurses play an important role in detecting early signs of postoperative complications, early reporting them to surgeons and try to solve them.

### **SIGNIFICANCE OF THE STUDY**

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Clear fluid and human milk leaves the stomach more rapidly than infant formulas and the emptying of non-human milk is similar to that of solids so that can cause post-operative complications. The importance of clear fluid and breast milk feeding preoperatively must be learned to doctors, nurses and parents to decrease the postoperative complications (aspiration, regurgitation and vomiting) among toddler.

### **AIMS OF THE STUDY**

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- To assess the effects of feeding types (clear fluid, breast milk, formula milk and adult food) before abdominal operations on postoperative complications (aspiration, regurgitation and vomiting) among toddler stage.
- To improve nurse knowledge about pre and post-operative care especially preoperative fasting (foods types and duration) and immediate post-operative complications; how detect & how correct?

### **HYPOTHESIS**

Toddlers who will receive clear fluid and breast milk preoperatively will experience lower postoperative complications than who will receive formula milk and solid food.

### **SUBJECTS AND METHOD**

#### **Research design:-**

Comparative descriptive research design was used to carry out this study to fit the nature of the problem under investigation.

#### **Setting:-**

The study was conduct in the Pediatric Surgery Unit at Assiut University Pediatric Hospital.

**Subjects:** this study included a convenient sample of 100 child patients who were selected from the previous setting. They were randomly divided into four groups (25 in each group):

1. Group one received clear fluid before fasting
2. Group two received breast milk before fasting
3. Group three received formula milk before fasting
4. Group four received adult food before fasting.

**The criteria for the selection of the study subjects were as follow:**

1. Both sexes.
2. Children at toddler stage (from1-3years).

3. Children who will be operated upon for an elective abdominal operation under general anesthesia

**Exclusion Criteria**

1. Children with medical problems (gastroenteritis infection, esophageal reflux, diabetes, or heart disease)
2. Children who will be operated upon for an emergency abdominal operation or whom operations will be done under local anesthesia

**Tool**

One tool for collecting data was used in this study:

**Tool one: Assessment sheet for child:**

It was developed by the researcher after review of literature and consisted of three parts:

**Part one:** Demographic and clinical data about child such as age, gender, medical history, type of operation and anesthesia.

**Part two:** Child's food consumption pattern sheet: such as, type of feeding and preoperative fasting time.

**Part three:** Observation sheet was developed to assess the postoperative complications as; aspiration, regurgitation and vomiting immediately postoperatively.

**1- Method**

1. Official Permission was obtained from the director of Pediatric Surgical Unit– Assiut University pediatric Hospital.
2. Written consent from parents of studied children was obtained.

3. Tool was developed by the researcher after reviewing of literature. Then the contents of the assessment sheet were given to a panel of five pediatric surgeons and anaesthetists with more than five years' experience to determine the content validity, where its value was 91%

4. Reliability of the tool was estimated by Alpha Cronbach, s test for tool one and its value was R=0.83.3

5. **Pilot study** was carried out on 10 children (10% of the subjects) to test the feasibility and applicability of the tools. Necessary modification was done. They were excluded from the sample.

6. Confidentiality of the researcher was asserted. Explanation of the aim and methodology of the study was done to children's parents by the researcher. The right to refuse to participate in the study was emphasized to the children's parents.

**10- Data collection:**

1. Assessment of socio–demographic characteristics of children conditions were done by the researcher through using tool one (part I,II,III) for all four groups (study groups).
2. On the morning of the operation's day (among the last four hours before operation); data related to demographic and clinical data about child as age, gender, medical history, type of operation and anesthesia and child's food consumption pattern as type of preoperative feeding (clear fluid, breast milk, formula milk and adult food), time of preoperative fasting time was assessed.

3. Immediate postoperative complication (aspiration, regurgitation and vomiting) among the 1<sup>st</sup> hour were assessed.
4. Distribute brochure for nurses tuoba pre and post-operative care especially preoperative fasting (foods types and duration) and immediate post-operative complications how detect & how correct?

### Field of the work

- The field work was carried out through a period of 12 months from January 2014 to January 2015.
- The time taken for filling each sheet ranged from 20 – 30 minutes (about 10 minutes before the operation & first 20 minutes immediate after it).

### Data analysis:

Collected data were revised and coded for computerized data entry. Data were then verified prior to statistical analysis. Statistical methods were applied including descriptive statistics as; (frequency, percentage, mean, and standard deviation), Z-test and Chi-square ( $\chi^2$ ) were used. P-values were considered as statistically significant when less than 0.05.

### Ethical considerations:

The researcher explained to mothers, anaesthetists, pediatric surgeons & nurses the aim of the study and that the information obtained will be confidential and only for the purpose of the study. Mothers have ethical rights to participate or refuse participation in the study. Consent to participate in the study was written from director and oral from mothers.

## Results

**Table (1)** show the distribution of breast milk, artificial milk, clear fluid, adult feeding toddlers according to their age, sex, diagnosis and community type. It's clear from table one that the majority (84%) of breast milk and clear fluid, all (100%) artificial milk, about third (32%) of adult feeding toddlers' age ranged from <2 years. About two thirds (68%) of breast milk feeding were male, while more than half (52%) of toddlers received clear fluid were female. Regarding the diagnosis it was found that the majority (84%) of toddlers received clear fluid were congenital diagnosis while about two thirds (68%) of toddlers received adult food were non congenital diagnosis. According to community type it was found that all (100%) of artificial milk feeding toddlers from urban and 68% of toddlers received adult food from rural.

**Table (2)** show the distribution of breast milk, artificial milk, clear fluid, adult feeding toddlers according to their type of operation and method of feeding preoperative. It was found that highly statistical significant difference was present between method of toddlers feeding preoperative oral feeding and nasogastric feeding of toddlers

High statistical significant difference was present between toddlers' elective operation and their emergency operation type ( $P < 0.001$ )

**Table (3)** show the distribution of breast milk, artificial milk, clear fluid, adult feeding toddlers according to their time of preoperative fasting (3,4,5,6,8,9 hours). It's clear from this table that all (100%) of toddlers received adult food were fasted eight hours preoperative and about half of toddlers received breast milk and (48%) of toddlers received clear fluid were found fasted 6 and 4 hours respectively.

**Table (4)** show the distribution of breast milk, artificial milk, clear fluid, adult feeding toddlers according to their immediate post-operative complications (aspiration, regurgitation and vomiting). It's clear from this table that no one of breast milk and clear fluids feeding toddlers suffered from any immediate post-operative complications (aspiration, regurgitation and vomiting). Only 4% of toddlers received artificial milk suffered from aspiration and about 12% of toddlers received adult food suffered from aspiration. No one of toddlers received breast milk and clear fluids feeding toddlers suffered from aspiration. Regarding to regurgitation about one quadrant (20%) of toddlers received adult food suffered from regurgitation, will 8% of toddlers received artificial milk suffered from regurgitation. No one of toddlers received breast milk and clear fluids feeding toddlers suffered from regurgitation. According to vomiting more than one third (36%) of toddlers received adult food suffered from vomiting, and 12% of toddlers received artificial milk suffered from vomiting. No one of toddlers received breast milk and clear fluids feeding toddlers suffered from vomiting. No statistical significant differences were present between type of toddlers' feeding types and their immediate post-operative complications.

**Figure (1)** show the distribution of aspirated toddlers according to type of feeding preoperative it was observed quadrant (25%) of aspirated cases were found to toddlers received artificial milk preoperative and three quadrants (75%) of them were received adult foods preoperative, will no aspirated cases were found among

toddlers whom received breast milk and clear fluid preoperative.

**Figure (2)** show the distribution of regurgitated toddlers according to type of feeding preoperative it was observed about 29% of aspirated cases were found to toddlers received artificial milk preoperative and about 71% of them were received adult foods preoperative, will no regurgitated cases were found among toddlers whom received breast milk and clear fluid preoperative.

**Figure (3)** show the distribution of vomited toddlers according to type of feeding preoperative it was observed quadrant (25%) of aspirated cases were found to toddlers received artificial milk preoperative and three quadrants (75%) of them were received adult foods preoperative, will no aspirated cases were found among toddlers whom received breast milk and clear fluid preoperative.

**Table (5)** show the distribution of time of preoperative fasting according to immediate post-operative complications. It was found that regarding to toddlers' preoperative fasting time it was observed half (50%) of aspirated cases were found to toddlers fasted three hours preoperative and half (50%) of cases suffered from vomiting found among toddlers fasted three hours preoperative. No post-operative aspirations were occurred among toddlers fasted four, eight and nine hours preoperative. No statistical significant difference was present between toddlers' immediate post-operative complications (aspiration, regurgitation and vomiting) and preoperative fasting time.

**Table (1):- Distribution of breast milk feeding, formula feeding, clear fluid and adult food toddlers according to their age, sex, diagnosis and community type ( No= 100).**

Item	Breast-fed (No.=25)		Formula-fed (No.=25)		Clear fluid (No.=25)		Adult food (No.=25)		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%
<b>Child age</b>										
1-<2 years	21	84.0	25	100.0	21	84.0	8	32.0	75	75
>2-3 years	4	16.0	0	0.0	4	16.0	17	68.0	25	25
<b>Sex</b>										
Male	17	68.0	13	52.0	12	48.0	16	64.0	58	58
Female	8	32.0	12	48.0	13	52.0	9	36.0	42	42
<b>Diagnosis</b>										
Congenital	13	52.0	13	52.0	21	84.0	8	32.0	55	55
Acquired	12	48.0	12	48.0	4	16.0	17	68.0	45	45
<b>Residence</b>										
Urban	13	52.0	25	100.0	9	36.0	8	32.0	55	55
Rural	12	48.0	0	0.0	16	64.0	17	68.0	45	45

**Table (2):** Distribution of breast milk feeding, formula feeding, clear fluid and adult food toddlers according to their type of operation and method of feeding preoperative (No.=100)

Item	Total		Breast-fed (No.=25)		Formula-fed (No.=25)		Clear fluid (No.=25)		Adult food (No.=25)		P. value
	No.	%	No.	%	No.	%	No.	%	No.	%	
<b>Method of Feeding Preoperative</b>											
Oral	65	65	25	100.0	6	24.0	17	68.0	17	68.0	<0.001**
Nasogastric	35	35	0	0.0	19	76.0	8	32.0	8	32.0	
<b>Type of Operation</b>											
Elective	78	78	9	36.0	19	76.0	25	100.0	25	100.0	<0.001**
Emergency	22	22	16	64.0	6	24.0	0	0.0	0	0.0	

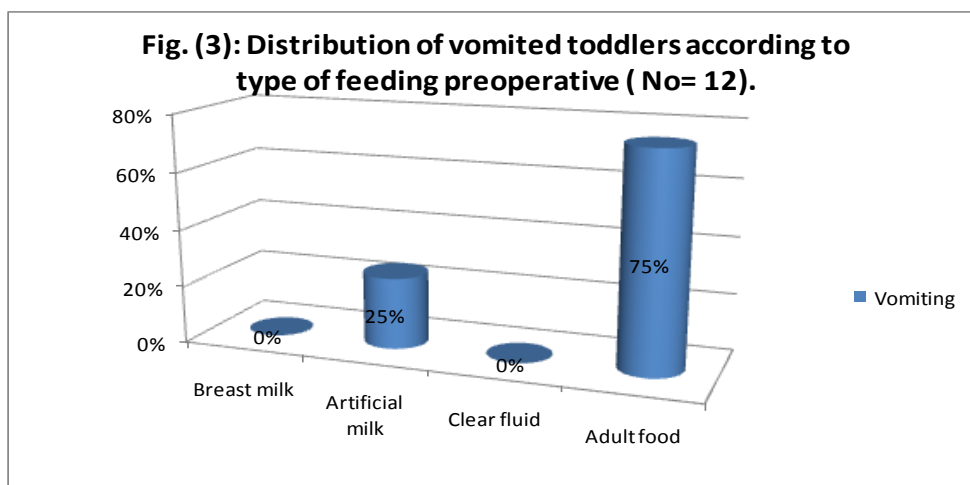
\*\* High Statistically significant difference (p<0.01)

**Table (3):** Distribution of breast milk feeding, formula feeding, clear fluid and adult food toddlers according to their time of preoperative fasting

Item	Total	Breast-fed (No.=25)		Formula-fed (No.=25)		Clear fluid (No.=25)		Adult food (No.=25)	
		No.	%	No.	%	No.	%	No.	%
<b>Time of preoperative fasting</b>									
3 hours	4	4	16.0	0	0.0	0	0.0	0	0.0
4 hours	16	4	16.0	0	0.0	12	48.0	0	0.0
5 hours	10	0	0.0	6	24.0	4	16.0	0	0.0
6 hours	24	13	52.0	7	28.0	4	16.0	0	0.0
8 hours	40	4	16.0	6	24.0	5	20.0	25	100.0
9 hours	6	0	0.0	6	24.0	0	0.0	0	0.0

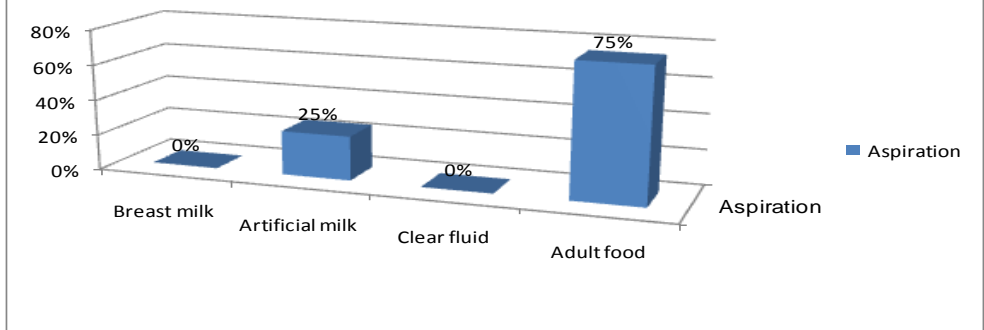
**Table (4):** Distribution of breast milk feeding, formula feeding, clear fluid and adult food toddlers according to their immediate post-operative complications

Item	Breast-fed (No.=25)		Formula-fed (No.=25)		Clear fluid (No.=25)		Adult food (No.=25)		P. value
	No.	%	No.	%	No.	%	No.	%	
<b>Immediate post-operative complications</b>									
Aspiration=4	0	0.0	1	4.0	0	0.0	3	12.0	0.602
Regurgitation=7	0	0.0	2	8.0	0	0.0	5	20.0	0.415
Vomiting=12	0	0.0	3	12.0	0	0.0	9	36.0	0.097

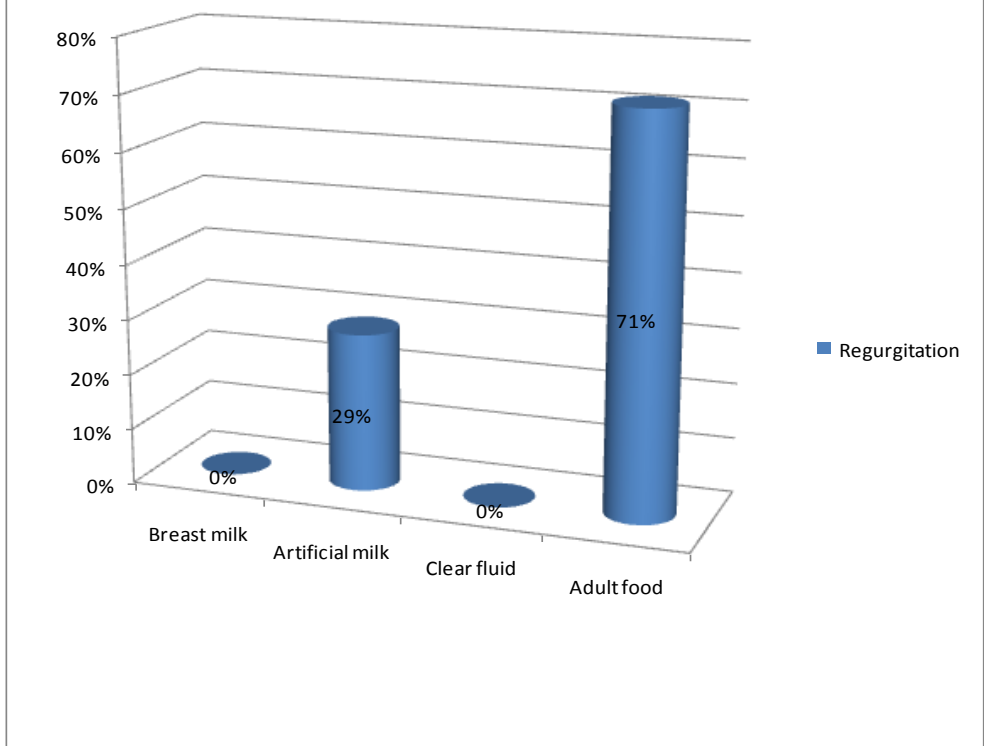




**Fig. (1): Distribution of aspirated toddlers according to type of feeding preoperative ( No= 4).**



**Fig. (2): Distribution of regurgitated toddlers according to type of feeding preoperative ( No= 7).**



**Table (5):** Distribution of time of preoperative fasting according to immediate post-operative complications

Item	Aspiration (n=4)		Regurgitation (n=7)		Vomiting (n=12)		P. value
	No.	%	No.	%	No.	%	
<b>Time of preoperative fasting</b>							
3 hours	2	50.0	3	42.9	6	50.0	0.307
4 hours	0	0.0	1	14.3	2	16.7	0.564
5 hours	1	25.0	1	14.3	4	33.3	0.223
6 hours	1	25.0	1	14.3	0	0.0	1.000
8 hours	0	0.0	1	14.3	0	0.0	-
9 hours	0	0.0	0	0.0	0	0.0	-
<b>P. value</b>	0.779		0.683		0.368		

**Discussion**

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Our greater understanding of gastric physiology and the epidemiology of Mendelson's syndrome has allowed the traditional guidelines for preoperative fasting (nothing by mouth after midnight or 6 hours before surgery) to be changed, based on the results of many scientific studies (**Thomsen et al., 2014**).

The stomach is not emptied of liquids and solids in the same way, and therefore preoperative fasting should not be the same for both. Human milk leaves the stomach more rapidly than infant formulas, and the emptying of non-human milk is similar to that of solids (**Ziegler et al., 2013**).

Fasting does not guarantee that the stomach will be empty or that the pH of gastric juices will be high; moreover, shortening the preoperative fasting period may bring several advantages for the patient. Factors such as premedication, anxiety, age, certain associated diseases or injuries may or may not influence gastric emptying and/or acidity at the time of anesthesia (**Dumville et al., 2010**).

The finding of the present study showed that 4% of toddlers received artificial milk suffered from aspiration and about 12% of toddlers received adult food suffered from

aspiration. No one of toddlers received breast milk feeding and

The results of the present study were consistent with **Soreide et al., (2009)** reported that the human milk leaves the stomach more rapidly than infant formulas that leading to less incidence (no case of aspiration of human milk feed) of post-operative complications as aspiration and discomfort.

In this study, it was observed that clear from table four that no one of breast milk and clear fluids feeding toddlers suffered from any immediate post-operative complications (aspiration, regurgitation and vomiting). Only 4% of toddlers received artificial milk suffered from aspiration and about 12% of toddlers received adult food suffered from aspiration. Regarding to regurgitation about one quadrant (20%) of toddlers received adult food suffered from regurgitation, will 8% of toddlers received artificial milk suffered from regurgitation. According to vomiting more than one third (36%) of toddlers received adult food suffered from vomiting, and 12% of toddlers received artificial milk suffered from vomiting.

Results of the present study were in-agreement with those obtained by the study of **Ghorashi et al., (2014)** reported that the children permitted adult food (77%) and formula milk (65%) had higher score of

aspiration, regurgitation, thirsty and vomiting comfortable than those who fasted after received clear fluids and human milk preoperatively.

Results of the present study were disagreement with those obtained by the study of **Dalal et al., (2010)** reported that the institutions differed in their categorization of human milk. It may be considered the equivalent of a clear liquid, solid, artificial baby milk, or something in between: 23 percent considered it as a clear liquid, 36 percent as between a clear liquid and formula, 7 percent the same as formula, and 34 percent as a solid. The category chosen affected the length of time that human milk was withheld.

In this study, it was observed from table five that no post-operative aspirations were occurred among toddlers fasted four, eight and nine hours preoperative.

Results of the present study were in-agreement with those reported by the study of **Pimenta et al., (2014)** reported that the children permitted feeding up to 3 hours preoperatively were not found to experience higher aspiration and vomiting and lower gastric pH values than those who fasted more than three hours.

**Hockenberry and Wilson., (2014)** reported that the toddlers not at risk for aspiration when allowed to ingest 150 ml water 2 hrs. prior to abdominal surgery.

Results of the present study were disagreement with those reported by the study of **Oppedal et al., (2012)** reported that the majority (86%) of studied children considered being at risk of regurgitation or aspiration after anaesthesia when fasted before 4 hours from operation.

The finding of the present study showed that half (50%) of aspirated cases were found to toddlers fasted three hours preoperative and half (50%) of cases suffered

from vomiting found among toddlers fasted three hours preoperative.

These results were disagreement with what mentioned by **Lopez et al., (2012)** added that only one case of regurgitation (2 %) in the control group and one case (0%) in the case group, and no case of aspiration evidence to suggest that taking clear fluids about 1 hour before child's operation will increase the risk of regurgitation. It confirms the safety of clear fluids more flexible fasting policies preoperatively.

**American Society of Anesthesiologists (ASA) (2011)** reported human milk is treated as being in between clear liquids (with a minimum fasting time of two hours) and non-human milk (with a minimum fasting time of six hours). The minimum fasting time the ASA recommends for human milk is four hours. Although this supports and promotes reduced fasting time in institutions that have or had policies with fasting times greater than four hours, this interval still represents a hardship for breastfeeding families striving to normalize a difficult situation and comfort their child. It is no wonder that caring parents and health care providers continue to question the necessity for this hardship and attempt to reduce the preoperative fasting interval within reasonable safety limits.

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### Conclusions:

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Based on the results of the current study it was concluded that the toddlers received human milk and clear fluid have less immediate post-operative complications (aspiration, regurgitation and vomiting), will the toddlers received adult food and artificial milk have higher percent of immediate post-operative complications (aspiration, regurgitation and vomiting). No immediate post-operative complications were occur among toddlers fasted four, eight and nine hours preoperative.

**Recommendations:**

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Based on the findings of the current study, the following recommendations were proposed:

- Apply the three and four hour fasting time as a general guideline to preoperative fasting to decrease immediate post-operative complications (aspiration, regurgitation and vomiting).
- Generalize the fact of human milk and clear fluid benefit more than artificial milk and adult foods received before fasting in decreasing immediate post-operative complications (aspiration, regurgitation and vomiting).
- Health educational classrooms must be giving to mothers to encourage the mothers of toddlers under abdominal surgical operations during admission period at hospitals to apply the doctor's prescriptions about child's feeding type and time of preoperative fasting.
- Further researches should be doing in field of toddlers fasting pre-operative to decrease post-operative complications.

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