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Preoperative Fasting Time and Selected Postoperative Outcomes among Patients Undergoing Abdominal Surgeries: Correlation Study

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Abstract
Background: Prolonged preoperative fasting time had a negative impact on the recovery of the patient in the postoperative period. **Aim of the study:** was to determine the relationship between the preoperative fasting time and selected postoperative outcomes among patients undergoing abdominal surgeries at one of the University Hospitals Cairo-Egypt. **Research question:** What is the relationship between the preoperative fasting time and the selected postoperative outcomes (patients' blood glucose levels, blood pressure and vomiting frequency) among patients undergoing abdominal surgeries? **Design:** Descriptive-correlation design was utilized. **Setting**: The study was conducted on waiting areas of general surgery operating room at 2nd and 3rd floor in addition to the general surgical wards at one of the University Hospitals. **Subjects:** A convenience sample of 60 female & male adult patients with the following inclusion criteria: 1- undergoing abdominal surgeries, 2- have no diabetes or hypertension were recruited in the current study **Tools:** Two tools were utilized to collect data pertinent to the study; **I**- A semi-structured interview questionnaire, it contained two parts: **1:** Demographic data **2:** Surgical patient's clinical data. **II** - Postoperative outcomes data sheet: It included measurement of the three selected postoperative outcomes. **Results:** The current study findings revealed that nearly three quarters of the study sample fasted for longer than required time with a mean± SD= 11.1 ± 2.5 and more than two third of the study sample had waiting time between 3->6 hrs. There was a significance difference between pre-operative & post-operative, post-operative & baseline readings regarding the systolic blood pressure and between the baseline and the pre-operative diastolic blood pressure. There was a positive moderate correlation between the pre-operative fasting time and the post-operative blood glucose results r=0.41. Also, there was a strong correlation between baseline and preoperative blood glucose results r=0.77, while, There was no correlation between frequency of vomiting post operatively and age, preoperative fasting time, waiting time, blood glucose, and blood pressure. **Conclusion:** There was a correlation between preoperative fasting time and blood glucose level followed by blood pressure while no correlation with vomiting frequency postoperatively. **Recommendations**: Awareness of heath care team regarding updating evidence-based preoperative fasting guidelines, nurse should measure blood glucose level and blood pressure for the non-diabetic as well as the diabetic patients before the surgical procedure and further studies are needed to determine the optimal fasting time and its effect on postoperative outcomes.
Keywords: Preoperative fasting time, waiting time, abdominal surgery, blood glucose level, blood pressure, postoperative vomiting.

Introduction

Preoperative fasting is an essential practice applied in patients undergoing surgical procedures. Patients undergoing general surgery ordered to be fasting for all solid foods and liquids beginning at midnight on the night before the surgical procedure (Sendelbach, 2010). This practice in health care system is a worldwide reality (Crenshaw, 2011). Restriction of food and fluid intake for surgical patient midnight preceding to general anaesthesia has long been seen as crucial to patient's safety, and a method of reducing the hazard of regurgitation of gastric contents. When anaesthesia is induced there is an inhibition of the body's normal automatic functions, such as those that control breathing, heartbeat, circulation of the blood (e.g. blood pressure), movements of the digestive system, and swallowing, coughing, or gagging reflexes that protect the airway and decrease the risk of pulmonary aspiration (Brady, Kinn and Stuart 2003, In Seyedhejazi, 2014)

Preoperative fasting is obligatory before general anesthesia to reduce the volume and acidity of the stomach contents, prevention of aspiration, vomiting, regurgitation and necessary for patient safety even though the duration is significant (Manchikanti, Malla, Wargo & Fellows, 2011; and Ludwig, Paludo, Fernandes & Scherer, 2013). In many health institutions, the patient remains fasting for much longer, about 12 to 16 hours (Aroni et al., 2012). Additionally, fasting can be prolonged when surgery is delayed. Hence, fasting period may be extended further (Pexe-Machado, de Oliveira, Dock-Nascimento & de Aguilar-Nascimento, 2013).

Numerous factors contribute to the increase of the preoperative fasting time, such as delays in the surgical ward, maximization of fasting by the patient and changes in the scheduling of the surgery which make the actual time of fasting at times much longer than that prescribed. Therefore, the organic response to trauma begins earlier with this prolonged fasting (Ribeiro de Amorim, Damasceno de Souza, Leide da Silva, Bezerra da

Silva, Cristiano de Souza & Gadelha, 2015). A prolonged perioperative fasting time contributes negatively to the improvement of postoperative recovery that leads to an increase in catabolic pathways that might increase the risk of certain postoperative complications. Postoperative insulin resistance can be taking place after operation and long fasting time may worsen this resistance (Faria et al., 2009). Moreover, the incidence of postoperative nausea and vomiting increase with prolonged fasting (Crenshaw 2011 & Blanchard, 2012).

Prolonged fasting time affects patients' physical and psychological well-being and causes several undesirable effects: increased patient discomfort, irritability, anxiety, headache, dehydration, emesis, hypotension, hypovolemia, and hypoglycemia, confusion, insulin resistance, electrolyte imbalance, nausea, poor wound healing, and a depressed immune system as well as decrease patient satisfaction and lengthened hospital stay (Anderson and Comrie, 2009; Gunawardhana, 2012 and Gül, Andsoy, Üstündağ & Özkaya, 2013).

Both health team and patients believe that fasting from midnight is safer. However the fasted state at the time of operation has recently been shown to represent an additional stress. Prolonged preoperative fasting in abdominal surgery results in a marked increase of insulin resistance. This modification of normal metabolism rapidly takes place after trauma in 1-2 days and lasts for 2-4 weeks in uncomplicated abdominal surgery. A pronounced insulin resistance has been demonstrated immediately after completion of surgery. Both the metabolic response and the degree of insulin resistance following abdominal surgery are related to the magnitude of the surgery performed and usually last until the recovery of the patient (Aguilar-Nascimento & Dock-Nascimento, 2010).

Pre-operative fasting period is not monitored efficiently in the developing countries though it may lead to critical consequences (Rahman, Ali & Chowdhury, 2011). On the other hand, extended preoperative fasting is not only distressing for patients and their families, but also does not improve clinical outcomes. Preoperative fasting duration deprives patients of nutrition and hydration. Medical and nursing staff worried for their patients' well being, hydration, comfort and safety strives to establish safe levels of preoperative fasting time without unnecessary starvation of patients (Salman, Asida & Ali, 2013).

Nurses will be concerned to do "good" and prevent "harm" to the patient. By implementing evidence-based preoperative fasting, patients would not be put at risk but would receive a lot of therapeutic benefits in the form of reduced anxiety, discomfort, headache, thirst and hunger; reduced postoperative nausea and vomiting; and reduced dehydration. As well as, Nurses should strengthen health education among patients, providing diet and fasting instructions prior to general abdominal surgical procedures. In this way, patients may avoid vomiting, other dangers and discomforts caused by a fasting time interval that is too long, and nurses can promote patient safety, comfort, and enhance positive postoperative outcome (Winslow & Crenshaw, 2010)

It's been over a decade since the American Society of Anesthesiologists (ASA) guidelines were published (Practice guidelines for preoperative fasting and the use of pharmacologic agents to reduce the risk of pulmonary aspiration, 1999). The safety and benefits of shortened fasting are clear. Preoperative fasting is a traditional procedure to be practiced before surgery; however, it is still debated optimal preoperative fasting time (Taniguchi, Sasaki and Fujita, 2012). Therefore, the aim of the current study is to determine the relationship between the preoperative fasting time and selected postoperative outcomes among patients undergoing abdominal surgeries.

Significance of the study

Worldwide approximately 234 million surgical procedures are done in one year. In spite of widespread advances in medical care, surgery remains a common treatment option for effective and varied range of diseases (Brinckmann, et al, 2013). Patient fasts before an operation is one of the most essential pre-operative responsibilities of nurses according to the medical prescribed fasting time ranged between 6-to-8 hours however, nurses share the responsibility for recommending excessively long fasts, and for patients' lack of understanding of the rational of being fast. The patients exceed fasting time from10-to-14 hours and above waiting for surgery because it was late or change schedule. In addition, the study carried out by Salman, Asida & Ali (2013) under title of "current knowledge, practice and attitude of preoperative fasting": reported that A limited survey among Upper Egypt anesthetists revealed that the majority of studied anesthetists 73 (72.27%) (T group: 101) are aware of the reducing fasting time 2hrs for fluid and 6 hours for solid diet for effective postoperative outcomes; however, they are still practicing strict preoperative NPO from midnight. As well, review of literature ensure that postoperative nausea, vomiting and insulin resistance still remains one of the most common outcomes in acceptably high incidence of 20 to 60% after general anaesthesia and enhanced with prolonged fasting time.

It is evident from the literature review that most of the research-based materials pertaining to to preoperative fasting, which are mostly foundation studies on the issue, are limited in medical and anesthetic journals which may not be easily accessible to nurses. Inaccessibility of such research findings to nurses may be a most important barrier in preoperative fasting not being based on the evidence. Apart from this, some nurses may be reluctant to put evidence-based preoperative fasting into practice if clinical guidelines are not in place. Moreover, The number of studies that determine whether there are positive or negative relationships between

preoperative fasting time and postoperative outcomes is inadequate as well observational studies report inconsistent findings or do not give conclusion of positive or negative relationships (Apfelbaum, et al 2011). Therefore, the current study is a trial to determine the relationships between preoperative fasting time and selected postoperative outcomes among patients undergoing abdominal surgeries. Hoped that, according to the findings of this study nurses put this knowledge into practice and consequently, provide safe and high quality of care for patients.

Aim of the study

The aim of the current study is to determine the relationship between the preoperative fasting time and selected postoperative outcomes among patients undergoing abdominal surgeries at one of the University Hospitals Cairo-Egypt.

Research question

What is the relation between the preoperative fasting time and the selected postoperative outcomes (patients' blood glucose levels, blood pressure and vomiting frequency) among patients undergoing abdominal surgeries?

Subjects and methods

Research design:

Descriptive, correlation design was utilized to achieve the aim of the current research. This design is used to discover relationships among variables and to allow the prediction of future events from present knowledge. However, correlation does not imply causation. Descriptive design provides a relatively complete picture of what is occurring at a given time. Allows the development of questions for further study
(Burns, Grove & Gray, 2011 and Terry, 2015).

Setting

The study was conducted on waiting areas of general surgery operating room at 2nd and 3rd floor in addition to the general surgical wards (25, 30, 28, and 27) at one of the University Hospitals, affiliated to Cairo University-Egypt.

Subjects

A convenient sample of 60 adult male & female patients who met the inclusion criteria which were 1- undergoing abdominal surgeries, 2- have no diabetes or hypertension, were enrolled in the current study.

Tools

With the purpose of achieve the current study aim the researchers were developed two tools to collect data as follows:

Tool I: A semi-structured interview questionnaire, it contained two parts: **Part 1:**-Demographic data such as age, gender, education, occupation…. etc. **Part 2:** Surgical patient's clinical data include patients' diagnosis, name of surgery, preoperative duration, preoperative fasting time and waiting time…… etc.

Tool II - Postoperative outcomes data sheet: it included measurement of three selected postoperative outcomes which were **1-**Patients' blood glucose level by Glucometers (it is an apparatus used by the researchers to measure patient's blood glucose level (BGL) by strip method from patients' Middle finger) and its reading interpreted according to **American Diabetes Association (ADA, 2015)** criteria of fasting BGL as follows Hypoglycemia: (< 60), Normal: (60- >100), Prediabetic: (100-≥125) & Diabetic (≥ 126), and criteria of random BGL as follows Hypoglycemia: (< 60), Normal: (60- >140), Prediabetic: (140->200) & Diabetic (≥ 200). **2-** Blood pressure using Android Sphygmomanometer (it is an apparatus measured patients' blood pressure from their upper extremity) and its reading interpretation based on the **American Heart Association (AHA, 2016)** classification as follows: Normal blood pressure from 90/60 to 119/79 mmhg, Prehypertension from 120/80 to 139/89 mmhg.**,** Hypertension stage 1 from 140/90 to 159/99mmhg., and Hypertension stage 2 equal or higher than 160/110 mmhg., while hypertension crisis higher than 180/110 mmhg., **3-** Vomiting frequency.

Validity and reliability

Content validity of this study tools will be reviewed by five experts in field of medical–surgical nursing. While **reliability** of the tool was conducted by the researchers as (Cronbach's alpha) = 0.70.

Pilot study

Once official permission was obtained, a pilot study conducted on ten subjects to judge the feasibility, applicability, objectivity of the study and test ability of the tool to draw out the desired information. No tool modification was needed.

Ethical Consideration

An official permission was obtained from hospital/units administrators to conduct the study. Each participant was informed about the purpose and nature of the study and its significance. Also consent was taken from each patients who have been joined the study. The researchers emphasized that participation in the study is entirely voluntary; anonymity and confidentiality are assured through coding the data.

Procedure

Once official permission was granted from the hospital authoritative personnel to precede the study, data collection took place through three phases from October 2015 to March 2016. **Phase one,** preoperative phase (one day before surgery) during this phase patients who meet the inclusion criteria and agree to participate in the current study were interviewed individually for about 20 to 30 minutes in order to explained the nature and the purpose of the study then demographic and surgical patient's clinical data were collected by the researches using the semi structured interview questionnaire and validated from patient's file followed by measuring random blood glucose level and blood pressure as a baseline value. **Phase two,** immediate preoperative phase (day of surgery before induction of anesthesia) in the waiting room the researchers asking patients about the starting time of fasting until the time of operation to calculate preoperative fasting (duration of fasting from food and fluid) exactly; also fasting blood glucose level and blood pressure were measured for the second time. **Phase three,** post operative phase (one day after surgery) the researchers measured patient's random blood glucose level as patient on I.V. fluid, blood pressure and vomiting frequency using postoperative outcomes data sheet. The researchers select the third reading and vomiting frequency observation at the first day after the surgical procedure based on the thorough review of literature which emphasis on the modification of normal metabolism occur at the 1st and 2nd day after surgery and also according to the policy of the surgical departments at the university hospital, affiliated to Cairo University-Egypt as patients discharged early if uncomplicated to reduce the occurrence of infection.

Statistical analysis

The data was coded and tabulated by using a personal computer. Statistical Package for Social Science (SPSS) version 18 was utilized. Data was presented using descriptive statistics in the form of frequencies and percentage. Inferential statistics as compare of means, correlation were utilized. Statistical significance was considered at p-value ≤ 0.05.

Results

The results of the current study will be presented into two main sections: **section 1) -** Pertinent to the demographic and surgical patient's clinical data of the study sample as age, gender, education level, type of surgical procedure, fasting time ….etc. (Table 1&2)**.** Whilst **section 2)** - Covered the selected surgical outcomes and its readings one day before surgery as a baseline, on the morning of surgery before induction of anesthesia in the waiting room and one day postoperatively (Table, 3), and Preoperatively Compare of means regarding (different measurements of selected post operative outcomes) among the study sample was highlighted through (Table 4**)**. In addition (Table 5**)** displayed the correlation of the selected postoperative outcomes (blood glucose level, blood pressure & vomiting) with (waiting time, age & pre-operative fasting times) among the current study sample.

Table (1)Description of demographic characteristics among the study sample undergoing abdominal surgery (n=60).

Demographic data	No.	%
Age:	**Mean+SD**=38.3±13.5	
< 20	3	5%
20 - >30	14	23.3%
30 - >40	17	28.3%
40 - >50	15	25%
50 - >60	6	10%
60 - 70	5	8.4%
Gender:		
-Male	23	38.3%
-Female	37	61.7%
Marital Status:		
-Single	14	23.3%
-Married	45	75%
-Widowed	1	1.7%
Educational level:		
-Cannot read or write	14	23.3%
-Read & write	24	40%
-Secondary	1	1.7%
-Diploma	14	23.3%
-University	7	11.7%
Occupation:		
-House wife	29	48.3%
-Employee	8	13.3%
-Private work	10	16.7%
-Not working	13	21.7%

It was observed that 28% of the study sample their age ranged between 30- >40, followed by 25% and 23.3 their age ranged between 40- >50 & 20- >30 respectively with Mean±SD =38.3±13.5. Regarding gender 61.7% of them were female, and 75% were married. Concerning educational level 40% can read and write only, while 48.3% was house wife.

Table (2)Description of surgical data among the study sample undergoing abdominal surgery (n=60).

Medical data	No.	%
	Mean+SD=9±4.9	
Pre-hospital stay:		
<10 days	39	65%
10 >20 days	18	30%
20 ≥30 days	3	5%
Surgical procedure:		
Cholecystectomy	26	43.3%
Umbilical hernia	21	35%
Appendectomy	7	11.7%
Intestinal obstruction	3	5%
Gastric cancer	3	5%
Pre-operative fasting time:	**Mean+SD**=11.1±2.5	
6 - 8 hrs	16	26.7%
9 - 12 hrs	26	43.3%
13 - 15 hrs	18	30%
Waiting time:	**Mean+SD**=3.1±2.3	
0 hrs	16	26.7%
<3 hrs	8	13.3%
3 - >6 hrs	26	43.3%
6 - ≥8 hrs	10	16.7%

Pertaining to the pre-hospital stay the above table illustrated that 65% of the study sample were stayed in hospital before surgery <10 days followed by 30% was between 10-<20 with Mean±SD=9±4.9. Relation to the surgical procedure Cholecystectomy and umbilical hernia represented 43.3%, 35% respectively. 43.3. % of

the study sample their fasting time pre-operatively was between (9-12 hrs) with Mean±SD=11.1±2.5, and 43.3% of them wait for surgery between 3- <6 hrs with Mean±SD=3.1±2.3.

Table (3a) Description of selected post operative outcomes (blood glucose level reading through base line, preoperative and postoperative phase) among the study sample (n=60).

Selected Post operative outcome	No	%
1- Blood glucose level:	**Mean±SD**=93±15.9	
- Base line random reading		
- Hypoglycemia < 60 mg/dl	0	0%
- Normal 60- >140 mg/dl	59	98.3%
- Prediabetic 140->200 mg/dl	1	1.7%
- Diabetic ≥ 200 mg/dl	0	0%
- Preoperative fasting reading	**Mean±SD**=87.8±25.7	
- Hypoglycemia < 60 mg/dl	2	3.3%
- Normal 60- >100 mg/dl	49	81.7%
- Prediabetic 100-≥125 mg/dl	6	10%
- Diabetic ≥ 126 mg/dl	3	5%
- Postoperative random reading	**Mean±SD**=117±46.2	
- Hypoglycemia < 60 mg/dl	0	0%
- Normal 60- >140 mg/dl	48	80%
- Prediabetic 140->200 mg/dl	7	11.7%
- Diabetic ≥ 200 mg/dl	5	8.3%

Regarding the blood glucose level, it was found that 5% & 8.3% considered diabetic for pre-operative & post-operative reading respectively. While 1.7%, 10% & 11.7% of the study sample were Prediabetic for base line, preoperative & post operatively reading respectively.

Table (3b) Description of selected post operative outcomes (systolic & diastolic blood pressure readings through base line, preoperative and postoperative phase) and frequency of vomiting among the study sample (n=60).

Selected postoperative outcomes	Base line		Preoperative		Postoperative	
	No	**%**	**No**	**%**	**No**	**%**
Systolic Blood pressure reading	**Mean+SD**=115.7±10.8		**Mean±SD**=115.7±10.8		**Mean±SD**=113.3±11	
-Normal (90-119 mmhg)	27	45%	29	48.3%	33	55%
-Prehypertension(120-139mmhg)	29	48.3%	30	50%	27	45%
-Hypertension stage 1(140- 159 mmhg)	4	6.7%	1	1.7%	0	0%
Diastolic blood pressure reading	**Mean±SD**=74.9±8.8		**Mean±SD**=73.8±9		**Mean±SD**=73.7±8	
-Normal (60-79 mmhg)	32	53.3%	34	56.7%	33	55%
-Prehypertension(80 -89 mmhg)	20	33.3%	19	31.7%	25	41.7%
-Hypertension stage 1(90- 99 mmhg)	8	13.4%	7	11.6%	2	3.3%
Vomiting frequency					**Mean±SD**=1±1.3	
0 times					29	48.3%
1 >3 time					26	43.3%
3 >5 time					3	5%
5 >7 time					2	3.4%

Relation to systolic blood pressure 48.3%, 50% and 45% of patients were considered prehypertensive for base line, pre-operative & post-operative readings respectively while hypertension stage 1 represented 6.7% and 1.7% for base line and preoperative reading respectively. And for the high diastolic blood pressure 33.3%, 31.7% and 41.7% of patients were prehypertensive for base line, pre-operative & post-operative readings respectively. Regarding diastolic hypertension stage 1 represented 13.4%, 11.6% and 3.3% for base line, pre-operative & post-operative readings respectively. Concerning the frequency of vomiting one day post-operative 43.3% of the patients suffering from vomiting once or twice with Mean±SD=1±1.3.

Table (4) Compare of means regarding (different measurements of selected post operative outcomes) among the study sample (n=60).

Selected Post operative outcomes	Base line & Pre-operative	Pre-operative & Post-operative	Post-operative & Base line
	Paired T-test Result		
Blood Glucose	2.71*	5.68**	4.50**
Systolic blood pressure	1.56	2.06*	3.40**
Diastolic blood pressure	3.09**	0.16	1.23

P ≤ 0.05

There was a significance difference between base line & pre-operative, pre-operative & post-operative, post-operative & baseline readings regarding the blood glucose levels as follows 2.71, 5.68 & 4.50 respectively. While there was a significance difference between pre-operative & post-operative, post-operative & baseline readings regarding the systolic blood pressure as follows 2.06, 3.40 respectively. Finally there was significance difference between the baseline and the pre-operative diastolic blood pressure = 3.09.

Table (5) Correlation result of the (selected post operative outcome, waiting time, age and pre-operative fasting times) among patients undergoing abdominal surgery (n=60).

	Blood Glucose			Systolic BP.			Diastolic BP.			Postop. Vomit.
	Base	Pre.	Post.	Base	Pre.	Post.	Base	Pre.	Post.	Post.
Age	0.22	0.16	0.28*	0.34**	0.31**	0.32**	0.36**	0.36**	0.30**	-.09
Waiting time	0.17	0.14	0.40**	0.02	0.07	0.10	0.07	0.07	0.15	.193
Pre-operative Fasting time	016	0.07	0.41**	.04	0.04	0.07	0.11	0.01	.010	.23
Blood Glucose										
-Base blood glucose		0.77**	0.53**	0.25*	0.05	0.20	0.24	0.03	0.20	
-Pre blood glucose			0.51**	0.11	0.11	0.21	0.11	0.10	0.24	
-Post blood glucose				0.22	0.05	0.24	0.28*	0.06	0.21	
Post operative vomiting	- .002	-.20	- .20	.003	.15	.32*	.04	.06	.24	

P ≤0.05

BP. =Blood pressure & Base =base line, Pre.=Pre-operative, Post.=Post-operative

The correlation table shown up that there was a positive correlation regarding the following: weak correlation between age & post blood glucose=0.28 and it was a moderate correlation with Base, pre & post blood systolic measures=0.34, 0.31 & 0.32 respectively. Also there was a moderate correlation with base, pre & post blood diastolic measures=0.36, 0.36 & 0.30 respectively. For waiting time there was a moderate correlation with the post blood glucose reading=0.40. And there was a moderate correlation between the pre-operative fasting time with the post-operative blood glucose result=0.41. Also the table shown up the strong correlation between the base and the pre-operative blood glucose result=0.77 also it shown the moderate correlation between the base and the post blood glucose result=0.53 and the moderate correlation between the pre and the post blood glucose result=0.51. In addition, there was a weak correlation between the base blood glucose and the base blood systolic blood pressure measures=0.25. Finally there is no correlation between frequency of vomiting post operatively and age, preoperative fasting time, waiting time, blood glucose, and blood pressure.

Discussion

Preoperative overnight fasting changes patient metabolic state and influences their perioperative stress response and consequently affect postoperative patients' outcomes (Singh, et al., 2015). So it was crucial to conduct this study to determine the relationship between the preoperative fasting time and selected postoperative outcomes among patients undergoing abdominal surgeries.

The following discussion will focus upon the findings that answer the current research question : What is the relationship between the preoperative fasting time and the selected postoperative outcomes (patients' blood glucose levels, blood pressure and vomiting frequency in the following sequences: **A.** Patients' preoperative fating time, **B.** The relation between preoperative fasting time and patients' blood glucose level, **C.** The relation between preoperative fasting time and blood pressure, **D.** Finally the Relation between Preoperative fasting time and vomiting frequency.

A. Patients' preoperative fating time:

The findings of the study revealed that nearly three quarters of the study sample fasted for longer than required time with Mean±SD=11.1±2.5 and more than two third of the study sample had waiting time between 3->6 hrs with Mean±SD=3.1±2.3 which exceeded the prescribed and routine midnight fasting time. This findings were

similar with the study was done by Andrew-Romit & Van de Mortel (2011) using electronic databases for journal articles and reference lists to describe preoperative fasting studies conducted on adult patients between January 2000 and January 2010 revealed that patients are still fasting for prolonged periods prior to surgery and current clinical practice is ritualistic rather than evidence-based. Although evidence-based liberalized fasting guidelines were published over a decade ago.

Also, Gül, et al. (2013) carried out a research under title "Assessment of Preoperative Fasting Time in Elective General Surgery" and conducted a systematic literature review of preoperative fasting time in elective general surgery. Twelve studies were included in the review (randomized controlled trial n=6, cross-sectional n=5, non-randomized trial n=1) reported that; Most of patients were instructed to remain NPO after midnight; a long preoperative fasting is common practice in general anesthesia and the mean preoperative fasting times were 12.8+/-3.4 h. for fluids and 15.5+/-4.4 h. for solids. Manchikanti, Malla, Wargo & Fellows (2011) highlighted that nothing giving by mouth after midnight is still common practice for patients undergoing surgical procedure and there are no scientific reasons to keep a patient in prolonged preoperative fasting. This routine was questioned and shown to be unnecessary for most patients.

Furthermore; Brady, Kinn, Stuart & Ness (2010) supported the same perspective as he reported that through their systematic review of randomized controlled trials on preoperative fasting in adults, found that a shortened fluid fast in healthy patients did not correlate with an increased risk of aspiration and ingestion of clear fluid two to three hours prior to surgery can actually decrease gastric volumes. Although evidence-based liberalized fasting guidelines were published over a decade ago, patients are still fasting for prolonged periods prior to surgery and current clinical practice is ritualistic rather than evidence-based. It is time that health care organizations strive towards evidence-based fasting practices (Andrew-Romit & Van de Mortel, 2011).

B. The relation between preoperative fasting time and patients' blood glucose levels:

Regarding patient's blood glucose level the findings discovered that postoperatively half quarter of the study sample approximately seven patients considered as prediabetic while five of them their blood glucose reading indicated that those patients were diabetic compared to six patients prediabetic and three of the sample were diabetic preoperatively before induction of anesthesia in addition to one patient only considered prediabetic at the base line value before the patient starting fasting time. From the researcher's point of view; although the number of prediabetic or diabetic patients was limited and not representative to the total number of the study sample but it must not be neglected and taken into account because it sheds light on the consequences that will occur as a result of diabetes mellitus on the post operative patient's outcomes as well as one patient only prediabetic at the baseline value before starting fasting time compared to six and seven patient prediabetic at the pre and postoperative time indicate the effect of prolonged preoperative fasting time on the level of blood glucose level. Also during data collection and surgical clinical experiences measuring blood glucose level not applicable for nondiabetic patients so those patients not detected before surgical procedure. In the same line Abdelmalak, et al (2013) reported that preoperative blood glucose is related to surgical outcomes; and this relationship depends on the diabetes diagnosis status of the patient. Preoperative hyperglycemia should be given greater consideration in patients without diabetes than in those with diagnosed diabetes.

Concerning correlation between the pre-operative fasting time and patient blood glucose level the study findings point out that there was a moderate correlation between the pre-operative fasting time and the post-operative blood glucose level =0.41. While there was a strong correlation between the base and the pre-operative blood glucose result=0.77. The researchers interpreted this finding as several patients are at the waiting list that prolonged the preoperative fasting time therefore probably lead to elevation in the blood glucose level and acetone level as well. In fact Andrew-Romit & Van de Mortel, (2011) supported this perspective as they revealed that prolonged preoperative fasting is responsible for some adverse outcomes in patients undergoing abdominal surgeries. It may complicate the situation by producing severe to moderate dehydration, insulin resistance, electrolyte imbalance, nausea, vomiting, irritability and confusion

Additionally, the finding of the current study was similar to the study carried by Tauhid-Ul-Mulk, Rahman, Ali, Haque & Chowdhury (2010) entitled: influence of preoperative fasting time on maternal and neonatal blood glucose level in elective caesarean section under subarachnoid block. Subjects were allocated randomly by card sampling method into three groups (Group A: 4 hours, Group B: 6 hours and Group C for more than six hours but not exceeding nine hours. highly significant inverse correlation was observed between maternal fasting time and blood glucose before starting infusion. Also there was highly significant correlation between maternal fasting time and fasting blood glucose just before induction of anesthesia in group C. In another study conducted by Manchikanti, Malla, Wargo & Fellows (2011) mentioned that traditional preoperative fasting time may aggravate insulin resistance and influence the elevation of glycemia especially because it is frequently longer than the expected 6 to 8 hours and may be as long as 10 to 16 hours). Besides, overnight fasting may cause variable degrees of dehydration depending on the ultimate duration of the fasting period. Thus, even for general anesthesia, shorter preoperative fasting has been considered safer.

Recently, a study conducted by Sada, Krasniqi, Hamza, Gecaj-Gashi, Bicaj & Kavaja, (2014) reported

that insulin resistance, as a stress inducer, is a positive protective reaction against surgery. As a response to injury (surgery), activation of neuroendocrine and inflammation systems occurs as a protective reaction that initiates insulin resistance. However, beyond a point, this resistance begins to have negative consequences for patient health. Also they observed that in Cholecystectomy procedures, insulin sensitivity was reduced by 56% in one study ($P < 0.01$) .while in major colorectal surgery interventions, insulin sensitivity can be reduced as much as 90%. Moreover Gunawardhana, (2012) pointed to prolonged fasting leads to an increase in catabolic pathways that might increase the risk of certain postoperative complications. Postoperative insulin resistance can be occurring after operation and long fasting time may aggravate this resistance (Faria, et-al 2009). In addition, during surgery, there is a rise in the plasma glucose level in normal adult (Sharma, Sharma, Singh, Gurkhoo, & Qazi, 2011).

C. The relation between preoperative fasting time and patients' blood pressure:

In relation to patient's blood pressure it was found that, around half of the study sample considered prehypertensive patients at baseline value, pre & postoperative time compared to two patients only suffered from hypertension satge1 postoperatively. The researchers clarified that, there was an updated and new classification of the blood pressure from AHA (2016) which could detect and determine the risk group of patients. Also it was found a moderate correlation between baseline, preoperative & postoperative blood systolic measures. Also there was a moderate correlation between baseline, pre & post blood diastolic measures. This finding was in accordance with the study which conducted by Liang, Qin, Huang, Liao &Chen (2014) on timing of preoperative fasting and water deprivation in patients receiving fiberoptic bronchoscopy and revealed that there were significant differences in the incidence of dizziness, comfort level, anxiety, and blood pressure. Moreover they showed that a two hour fast and water ban prior to FB did reduce thirst and hunger that can lead to high blood pressure, dizziness, and anxiety.

Wang & Li,(2004) and Xie & Gao, (2010) reported that there is a significant positive correlation between thirst/ hunger and anxiety this is the result of pathological and physiological changes, such as activation of the sympathetic adrenal medulla system, enhancement of the hypothalamus - pituitary - adrenal cortex system, increased cortisol and catecholamine concentration in plasma, increased blood pressure, and increased heart rate**.**

D. The relation between preoperative fasting time and vomiting frequency:

Regarding to the frequency of vomiting the present study showed that more than one third of the patients had vomiting twice within the 24 hours postoperatively. This result was agree with several studies which conducted by de Aguilar-Nascimento & Dock-Nascimento, (2010) and Apfelbaum et al, (2011), who clarified that, post-operative nausea and vomiting (PONV) is the most reported complication after anesthesia and still occurs in 20-40% of patients despite preventive measures. Conversely, the current research finding revealed that there was no correlation between vomiting and preoperative fasting time in addition to waiting time. This finding according to the researcher's opinion and the literature review may be due to nausea and vomiting is a result of the anesthetic agent itself. A study done by Itou, et al (2012) which is in accordance as the proportion of those reporting perioperative anxiety, nausea, and vomiting did not differ significantly between the two group (oral rehydration solution group and fasting group). Tudor, (2006) & Klemetti, et al (2009) was against this finding who found that the incidence of postoperative nausea and vomiting increase with prolonged fasting

Finally prolonged fasting time might cause several unpleasant postoperative complications as insulin resistance, elevation of the blood glucose level, elevation of blood pressure.

Conclusion

There was a correlation between preoperative fasting time and blood glucose level followed by blood pressure while no correlation with vomiting frequency postoperatively.

Recommendations

- Further study is recommended on a larger patients' number.
- Availability of updating guideline of preoperative fasting time in the hospital policy.
- Monitoring of blood glucose level and blood pressure for the non-diabetic as well as the diabetic patients before any surgical procedure.
- Awareness of health team member about the updating classification of blood pressure to detect the risk group.
- Awareness of health team member about the effect of reduced preoperative fasting time on patient postoperative recovery.

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