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Faculty of Graduate Studies

Role of Intravenous Dextrose on Reducing PONV in Children Undergoing Tonsillectomy and /or Adenoidectomy

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Dedication

To my very profound gratitude to my parents, family and friends for providing me with unfailing support and continuous encouragement throughout my years of study, through the process of researching and writing this thesis. This accomplishment would not have been possible without them. Thank you.

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First, I give all the glory to God, the source of my strength, for granting me both the mental and physical endurance to complete this monumental task.

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الإقرار

أنا الموقع أدناه، مقدم الرسالة التي تحمل العنوان:

Role of Intravenous Dextrose on Reducing PONV in Children Undergoing Tonsillectomy and /or Adenoidectomy

أقر بأن ما اشتملت عليه هذه الرسالة أنما هو نتاج جهدي الخاص، باستثناء ما تمت الإشارة إليه حيثما ورد، وان هذه الرسالة ككل، أو أي جزء منها لم يقدم من قبل لنيل أيّ درجة أو لقب علميّ لدى أي مؤسسة تعليمية أو بحثية أخرى.

Declaration

The work provided in this thesis, unless otherwise referenced, is the researcher`s own work and has not been submitted from anywhere else, for any other degree or qualification.

اسم الطالب: **Student`s name:**

التوقيع **Signature:**

التاريخ: **Date:**

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Table of abbreviations

PONV	Postoperative Nausea and Vomiting
PACU	Post Anesthesia Care Unit
OR	Operation Room
ASA	American Society of Anesthesiologists
TIVA	Total Intravenous Anaesthesia
CRNA	Certified Registered Nurse Anesthetist
CSL	Compound Sodium Lactate
RL	Ringer Lactate
BMI	Body Mass Index
SPSS	Statistical Package for the Social Sciences
VAS-N	Visual Analog scale for Nausea
CTZ	Chemoreceptor Trigger Zone
VAS-P	Visual Analog Scale for Pain

Conceptual Definitions

Nausea: is an unpleasant feeling related to a sensation to vomit not correlated with expulsive muscular movement (Islam & Jain, 2004).

Vomiting: it is the powerful contraction of the abdominal muscles and the diaphragm leading to ejection of upper gastrointestinal contents through mouth (Islam & Jain, 2004)

Retching: when no stomach contents are evict even with expulsive muscular efforts(Islam & Jain, 2004), and it is a multiple regulated rhythmic contraction of the diaphragm and respiratory muscles, and the muscles of the abdominal wall without ejection of the stomach content. Retching is a sign of an empty stomach when gastric contents are not ejected out combined with expulsive efforts(Knapp & Beecher, 1956)

Fatigue: is physical, mental or both sensation of lack of energy that can caused by physical and mental illness or diseases, outside stressor and drugs. It's a symptom which is difficult to describe by the patients and words like lethargic, exhausted and tired may be used(Gates & Amaya, 2015).

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Abstract

Background. Post-operative nausea and vomiting (PONV) is the most frequent complication of Tonsillectomy and /or Adenoidectomy surgeries and is the major cause for readmissions and increase the length of stay in hospital.

Aims. The aims of the study are to evaluate the effect of postoperative administration of IV 5% dextrose on the incidence and severity of nausea, and incidence of vomiting in patients undergoing tonsillectomy/adenoidectomy and its effect on the incidence of another postoperative symptoms that are (pain, headache, drowsiness, fatigue, thirst, hunger and bleeding) and consumption of rescue antiemetic and rescue analgesia medications.

Methods. A prospective, randomized, controlled double-blind clinical trial in 90 Pediatric patients, aged 4-12 years, American Society of Anesthesiologist (ASA) physical status I and II. Patients undergoing adeno/tonsillectomy surgery under general anesthesia, were randomly assigned into two groups (n = 45 each). Group one, dextrose water (DW) group, and group two, ringer lactate (RL) group. The incidence of

postoperative symptoms focusing on the incidence and severity of nausea, and frequency of vomiting and the need for “rescue” medications are assessed at specific time intervals from 30 mints post operation until discharge.

Results. Intravenous dextrose water given postoperatively had a significant effect on decreasing the incidence of post-operative nausea at 30 mints (P-value 0.000), 1st hr after operation (P= 0.001) and the overall incidence of nausea (0-5 hr) was significantly lower in DW group 23(48.9%) compared to the RL group 35(77.8%), p= 0.004.

Moreover, The results indicated that 5% DW administered postoperatively reduces the intensity of nausea at 30 min, one hour, and on discharge from the hospital M±S.D of VAS-N scale in the DW group (0.04±0.3) is significantly lower than the RL group (0.4+0.91), p=0.015. Although there is a significant difference in the incidence of complete response in the dextrose group 23(51.1%) compared to RL group 10(22.2%), P=0.004 at 0-5 hrs.

There is a significant difference for use of rescue antiemetic drug of Ondansetron on the whole entire period of the study (0-5 hrs.) between the dextrose group 7(15.6%) compared to Ringer lactate group 17(37.8%), p=0.017.

The incidence of headache in overall period (0-5 hr.) in the DW group (0%(0)) is significantly lower compared to RL group 6(13.3%), p= 0.011. Also, the incidence of headache at 2hrs in the DW group (0%(0)) versus RL group 5(11.1%), P= 0.0.

In the overall period (0-5 hrS.),the number of patients with drowsiness in the RL group 36(80%) is significantly higher than the DW group 8(17.8%), p= 0.000, at 30 mints after operation in the DW group 5(11.1%)versus RL group 16(35.6%), p= 0.006, at 1hrs. After operation in the DW 3(6.7%) is significantly lower than the RL group 19(42.2%), P= 0.000. Like some drowsiness at 2 hrs. after operation in the Dw 0(0%) is significantly lower than RL group 8(17.8%), p=- 0.003.

The incidence of fatigue in the DW group is significantly lower than in the RL group at 30 minDW group 3(6.7%) versus the RL group 10(22.2%), p=0.036, one hour DW group 0(0%) versus the RL group 4(8.9%), p=0.041 and 4 hours postoperatively DW group 0(0%) versus RL group 4(8.9%), p=0.041.

Thirst at 3 hrs. after operation in the DW group 4(8.9%) is significantly lower than the RL group 11(24.4%,) p= 0.048, and at 4 hrs., the DW group 4(8.9%) versus the Ringer lactate group 11(24.4%), p=0.000, like some, number of patients with thirst at discharge in the DW group 1(2.2%) is significantly lower than the RL group 7(15.6%), p=0.026, also the overall period, the number of patients who were thirsty in the RL group 38(84.4) is

significantly higher than the number of patients who were thirsty in the DW group 13(28.9%), p= 0.000.

Hunger at 3 hrs. after the operation in the DW group 2(4.4%) is significantly lower than the RL group 18(40%), p= 0.000, and hunger in 4 hr DW group 9(20%) versus the RL group 23(51.1%), p= 0.002.

In the overall period (0-5 hr.), the number of patients who were hungry in the RL group39 (86.7%) is significantly higher than the number of patients who were hungry in the DW group19 (42.2%), p= 0.000.

Conclusion. The administration of intravenous dextrose postoperatively for pediatric patients undergoing adeno/tonsillectomy reduces the incidence and the Intensity of nausea, the consumption of rescue medication, incidence of headache, fatigue, thirst, hunger and had no significant effect on the incidence of vomiting, and the incidence and intensity of pain.

Key words: Dextrose water 5%, Postoperative Nausea; Vomiting; Pain; Headache, Drowsiness; Thirst; Hunger.

Chapter One

Introduction

1.1 Introduction

Tonsillectomy / or adenoidectomy is one of the greater implement surgical procedures among all procedures in children globally(Elgueta et al., 2012).

Tonsillectomy / or adenoidectomy is the eradication of pathogenic tonsil tissue and it is mostly performed in alliance with the eradication of adenoid tissue called adeno-toncillectomy.

The common manifestation for tonsillectomy minimizes airway obstruction and secondary obstructive apnea. Severe or frequent fungal infections, tonsil malignancy are other indications of tonsillectomy (Gonik & Parikh, 2013).

Post-operative nausea and vomiting after surgical intervention compelling general anesthesia are common and troublesome, the incidence of PONV is 70% in the first 24 hours of tonsillectomy influenced by the mean of abounding variables, including sex, age, anesthetic technique, use of opioids and the type of operation(Heshmati, Afshar, Mahoori, Zeinali, & Abbasivash, 2015)

Anesthesia as an induction, such as etomidate, had greatinfluences on PONV compared to thiopental sodium and propofol, Propofol as induction or maintenance called total intravenous anesthesia (TIVA) is combinedwith downturn in PONV(Rahman & Beattie, 2004).

Volatile inhaled anesthetics, sevoflurane and desflurane are combined with less PONV than enflurane or halothane. Nitric oxide rises the incidence of PONV by influence the central opioid receptors, bringing about to imbalance in the middle ear pressure(Rahman & Beattie, 2004).

Postoperative nausea and vomiting (PONV) is one of the main common reasons of postoperative tonsillectomy complication in children .It may reduce patient comfort and satisfaction, and the increment in postoperative hospitalization and may lead to unexpected admission and is the extensive anesthetic consideration for readmission in pediatric surgical ward(Elgueta et al., 2012).

The occurrence of PONV is high when there is no antiemetic prophylactic. So, it is relevance for the use of PONV prophylaxis of the tonsillectomy surgery, and copious of the PONV pharmacological antiemetics are costly and expensive and cannot completely displace PONV(Elgueta et al., 2012).

Contrarily, conventional drugs such as droperidol or methoclopromide utilized to manage PONV ,but there are some adverse effects of these pharmacological prophylaxis, such as muscle spasms, extrapyramidal symptoms, bradycardia, restlessness, fatigue, and dry mouth(Elgueta et al., 2012).

Postoperative administration of IV dextrose hence decreases the occurrence and intensity of nausea during the first 24 postoperatively. This

derives in scanty demands for rescue analgesics, lower hunger and fatigue but extra thirst postoperatively(Jain, Rao, Bala, Bharti, & Analgesia, 2016).

Administration of intravenous dextrose Postoperative as a prophylaxis was wrapped up in many studies as a prophylactic method to decrease the intensity and occurrence of nausea and vomiting, to improve PONV handling by decreasing the use of the antiemetic drug need and to decrease the length of time in PACU(Jain et al., 2016).

The use of dextrose 5% postoperative of endoscopic middle ear surgery emerged in improved PONV by decreasing the need for antiemetic consumption and PACU duration of stay (Irkal, Reddy, Vardhan, & Madhavi, 2016).

Discerning how PONV challenges mean for patients , how to counter nausea and vomiting in patients and increment the level of satisfaction at tonsillectomy is relevant for certified registered nurse anesthesia (CRNA) and alternative health care professionals contingent upon direct care for patients undergoing tonsillectomy.

The aim of the current study is to evaluate the effect of postoperative administration of IV 5% dextrose on the incidence , severity of nausea and the frequency of vomiting in patients undergoing tonsillectomy / adenoidectomy and its effect on the occurrence of other postoperative symptoms which are pain, headache, drowsiness, fatigue, thirst, hunger and bleeding) and consumption of rescue anti-emetic and analgesia.

1.2-Problem statement

Patients frequently list pain, nausea, and vomiting as their most important perioperative concerns especially in pediatric and incidence rate of PONV in childhood of between 33.2 and 82% can be twice as high compared with adults (Hohne, 2014). The incidence of postoperative vomiting (POV) following a pediatric adeno/tonsillectomy is 40-80%, (J. H. Chunget al., 2010).

PONV can lead to delayed postanaesthesia care unit (PACU) discharge and unanticipated increased hospital stay, thereby increasing medical costs, not only for the patient, but also for the hospital (Kovac, 2000).

Also PONV can lead to complications such as wound dehiscence, bleeding, gastric contents aspiration, fluid and electrolyte imbalances, delayed discharge, hospital readmission, and low patient satisfaction (Ku and Ong 2003).

With antiemetic agents, the occurrence is still high foreseen between 33% and 82% (Elgueta et al., 2012). Developed a simplified risk score getting along of four predictors: previous PONV or a positive family history, anesthesia (> 30 min), age (> 3 years) and strabismus surgery. If none, one, two, three or four of these risk factors were shown, the incidence of PONV was 9, 10, 30, 55 and 70%, respectively (Eberhart et al., 2004).

Correspondingly, some evidence shows that patients with moderate or high risk of progressing PONV, prophylactic antiemetics should be taken in deliberation.

Tonsillectomy is a frequent ENT surgical procedure and the postoperative morbidities that combined with tonsillectomy are nausea, vomiting, pain and bleeding (Khan, Mahsud, & Khan, 2013). Children undergoing tonsillectomy have a high risk of increasing the occurrence of PONV because a major anxiety affecting them related to poor understanding and awareness of surgical mechanism (Bennett & Emery, 2008).

The most frequent cause of PONV in post-tonsillectomy patients is swallowing of blood that can lead to gastrointestinal irritation, hence rising the occurrence of PONV (Khan et al., 2013).

Therefore, PONV prevention is therefore important to improve patient safety and medical outcomes, enhance patient satisfaction, and contain medical costs.

1.3 Significance of the study

The incidence of postoperative nausea and vomiting is approximately between 20% to 30% (Cohen et al., 1994), and in patients with high risk factors, the incidence reaches 70% (Apfel, Laara et al. 1999), while there's a multiple significant study about postoperative nausea and vomiting also using antiemetic agent , the incidence is still keeping high

estimated between 33.2 and 82% in childhood (Elgueta et al., 2013), so postoperative nausea and vomiting is the most complication that affect at children twice more than in adult (Hohne, 2014).

The most frequent morbidity of PONV such as bleeding, pulmonary aspiration of gastric contents, fluid and electrolyte disturbances, delayed hospital discharge, unexpected hospital overnight and reduced patient satisfaction (Ku & Ong, 2003). Apfel et al. found that patients were more afraid of PONV than postoperative pain, which substantiated the importance of avoiding incidence of PONV (Apfel, Kranke et al. 2004).

Peri-operative administration of carbohydrates is contemplated to be one of the non-pharmacological approaches for decreasing PONV, but due to the alteration in dosage, pathway and timing of carbohydrate administration, there have been contrary results of its effect on nausea, vomiting and well-being. Atashkhoei, et al., (2018) showed that intraoperative infusion of intravenous glucose decreased the overall occurrence and severity of PONV and antiemetic usage during 24 hours postoperative.

Oral Dextrose has been used over the years for symptomatic relief of nausea and vomiting, but clinical studies show mixed results (Hausel, et al., 2005). The exact mechanism has not been determined, but has been thought to be due to a direct local action on the wall of the gastrointestinal tract that reduces muscle contraction due to the high osmotic pressure exerted by the simple sugar (Griffenhagen, et al., 1989). Lauwick et al., (2009) examined

the effects of oral dextrose load 2 hours before induction of general anesthesia and reported that it had no effect on the rate of PONV. Cook et al., Cook, et al., (1990) and McCaul et al. (2003) investigated the use of preoperative IV hydration in combination with calorie supplements; The former authors failed to show a decrease in PONV incidence in the recovery room, while the latter showed an increased incidence.

We therefore designed a controlled, randomized study to evaluate the effect of postoperative administration of IV 5% dextrose on the incidence and severity of nausea, and incidence of vomiting in patients undergoing tonsillectomy/adenoidectomy and its effect on the other postoperative symptoms

1.4 Aims of the study

The aim of the current study is to evaluate the effect of postoperative administration of IV 5% dextrose on the incidence and severity of nausea and the frequency of vomiting in patients undergoing tonsillectomy / adenoidectomy and its effect on the occurrence of other postoperative symptoms that are pain, headache, drowsiness, fatigue, thirst, hunger, bleeding) and consumption of rescue anti-emetic and analgesia medications.

1.5 Primary Outcome Measures

The incidence and intensity of nausea and the frequency of vomiting after surgery.

1.6 Secondary outcome measures

Rescue antiemetic medication consumption and postoperative symptoms that are pain, headache, drowsiness, fatigue, hunger, thirst and bleeding.

1.7 Study questions

- Does the use of postoperative i.v. dextrose effective in reducing incidence and severity of PONV in patients undergoing tonsillectomy and /or adeniodectomy?

- Does the use of postoperative i.v. dextrose effective in reducing rescue antiemetic and rescue analgesic medication consumptions in patients undergoing tonsillectomy and /or adeniodectomy?

- Does the use of postoperative i.v. dextrose effective in reducing postoperative symptoms that are headache, pain, fatigue, drowsiness, hunger, thirst and bleeding.

1.8 Study Hypothesis

- There is a significant difference at level of $(\alpha \leq 0.5)$ related to the incidence and intensity of PONV between DW and RL groups.

- There is a significant difference at level of ($\alpha \leq 0.05$) related to the incidence of postoperative symptoms (pain, headache, fatigue, drowsiness, hungry and thirsty) between DW and RL groups.

- There is a significant difference at level of ($\alpha \leq 0.5$) related to the antiemetic medication consumption and analgesic medication consumption between DW and RL groups.

Chapter Two

Background

2.1-Background

2.1.1-Introduction

The occurrence of PONV reports reaches 70% during the first 24 hours after tonsillectomy. PONV is one of the most common causes of postoperative tonsillectomy complication in children, and may lead to reducing of patient comfort and satisfaction .Also, it is the main anesthetic consideration for readmission in pediatric surgical patients (Heshmati et al., 2015).

2.1.2-Physiology of PONV

PONV is one of the most causes of morbidity in pediatric because severe vomiting accompanied with dehydration, postoperative bleeding, pulmonary aspiration, and wound dehiscence. The mechanism of PONV in children is similar to adults else ways the frequency of PONV in children is greater than adults (Kovac, 2007).

Strabismus repair and adeno-tonsillectomy are the ultimate common surgical procedures assisted in pediatric, and those surgical procedures are the greater cause of PONV because of swallowing blood in adeno-tonsillectomy, and stimulation of extra ocular muscle in strabismus surgery, labyrinthine, otic, and vestibular stimulation in ear operations (Kovac, 2007).

The vomiting areas in the CNS contain the emetic centre, nucleus of the solitary tract, area postrema, and chemoreceptor trigger zone which is situated in the area postrema near the emetic centre at the base of the fourth ventricle , outside the blood–brain barrier(Kovac, 2007).

The comprehensive process which includes of nausea, retching, and vomiting is regulated by the vomiting center, stimulation which can be started from peripheral areas being the oropharynx, mediastinum, gastrointestinal tract, renal pelvis, peritoneum, or genitalia, and from central areas being the cerebral cortex, and labyrinthine, otic, or vestibular apparatus, sensory tactile stimulation of the posterior pharynx from endotracheal intubation or oral or nasal airway devices, and extraocular muscles operations that may trigger oculo-cardiac reflex(Kovac, 2007).

Metabolic, biochemical, and environmental factors are arbitrated by the vomiting center and the CTZ being hypoglycemia and hyperglycemia, sodium and potassium disturbances, estrogen and progesterone imbalances, chemotherapy, and radiation therapy(Kovac, 2007).

Great concentrations of enkephalin, opioids, and dopamine (D2) receptors were found in CTZ. The area postrema has large concentrations of opioids, D2, serotonin (5-hydroxytryptamine; 5-HT), and neurokinin-1 (NK-1) receptors. The nucleus of the solitary tract has a predominance of enkephalin, histamine, muscarinic, cholinergic, and NK-1 receptors, the nucleus of the solitary tract has a predominance of enkephalin, histamine, muscarinic, cholinergic, and NK-1 receptor (Kovac, 2007).

Factors such as drugs, electrolytes and metabolic chemicals trigger the emetic neuro-receptor regions that deed as sensors for these triggers, preeminent to impulses to be disseminated to the vomiting center, inducing the vomiting reflex to be initiated (Alkaissi, 2004).

The process of vomiting reflex is prorated into two stages, pre-ejection stage this is described by a sensation of nausea accompanied with cold, sweating, pupil dilatation, salivation and tachycardia triggered by sympathetic and parasympathetic nerves, and ejection stage that comprises of retching and vomiting with expulsion of gastric contents(Islam & Jain, 2004).

2.1.3-Risk factors of PONV

Patient, anesthetic and surgical factors devoting to the occurrence of PONV(Cao, White, & Ma, 2017).

I. Patient factors

Age

At birth, the occurrence of PONV decreases, but it inclined at peak at the end of childhood (between 6-16 years). This group is observed irrespective of the surgery done and this age group is frequently vomiting more(Bennett & Emery, 2008).

Gender

The PONV frequencies in women are greater in comparison to men related to hormonal changes due to the luteal phase of the menstrual cycle(Kenny, 1994) .The discharge of follicle stimulating hormone and estrogen during the menstrual cycle prior to the ovulation phase and under menstruation can be associated with PONV (Chatterjee, Rudra, & Sengupta, 2011), while prepubescent women have no inclined tendency to PONV in comparison to men (Eberhart et al., 2004). At the age of 13, girls have a higher incidence of PONV than boys (Munro, 2000).

History of PONV

A previous history of PONV in the children or relatives (mother, father or siblings) (Eberhart et al., 2004) or motion sickness inclines the risk of PONV by two to three times so that this factor has been expressed as a strong prediction factor for PONV (Ku & Ong, 2003).

Obesity

The occurrence of PONV inclined with increased BMI due to the extra fat tissue serving as a storage of anesthetic drug and over the production of estrogen by adipose tissue (Islam & Jain, 2004). When BMI levels increased over 30 in abdominal pressure ,it increases in patients leading to inclined risk of PONV (Chatterjee et al., 2011).

Opioids

Opioids that motivate high prevalence of PONV, by triggering the chemoreceptor triggering zone that causes to sending afferents to the vomiting center (Bennett & Emery, 2008). Opioids sluggish also the gastrointestinal motility leading to the emptying time decreasing and can lead to increased PONV, and also trigger the otic and vestibular areas of motion(Bennett & Emery, 2008).

Inhalational anesthetic agents

All inhalants are accompanied by PONV, despite the fact sevoflurane may be associated by reducing incidence of PONV. The character of nitric oxide continues to be questionable, but it seems like captivating in PONV. But, the absence from nitric oxide increases the opportunities for intra-operative awareness (Hartung & Analgesia, 1996).

Studies report that 25% of patients' experience PONV after general anesthesia with volatile anesthetics, but when volatile anesthesia was substitutes by total intravenous anesthesia (TIVA) such as Propofol, the incidence of PONV decreased to 20%. Evidence advocates that propofol may also have antiemetic properties(Song, Whitten, White, Song, & Zarate, 1998).

The amount of volatile anesthetic that is usually decreased by nitric oxide but accompanied with a 28% increased risk of vomiting(Bennett & Emery, 2008).

A number of conceivable mechanisms for nitrous oxide-induced nausea and vomiting have been suggested. These subsist are the response to central opioid and dopaminergic receptors(Ohashi, Guo, Orii, Maze, & Fujinaga, 2003), diffusion of nitric oxide into the middle ear(Davis, Moore, & Lahiri, 1979) and intestinal distension(Mehta, Ratra, Badola, & Bhargava, 1969).

The airway management, ventilation and gastric emptying

Face masks ventilation can source of gastric distention leading to the stimulation of the vomiting reflex and incline the occurrence of PONV. The occurrence of PONV does not reduced by per-operative gastric evacuation with a nasogastric tube. On the other hand, airway management does not seem to have a main impact on PONV (Öbrink, Jildenstål, Oddby, & Jakobsson, 2015).

II. Surgical factors:

Surgical Technique

The vomiting center of the medulla oblongata monitors the vomiting reflex. The afferent entrances to this center are presented in the facial mucosa and the posterior oropharynx. Origin in these areas can cause stimulation of the trigeminal nerve and increase the occurrence of PONV. Patients undergoing tonsillectomy are doubted of swallowing blood from the surgical site due to neck extension position that may open the hypopharynx and laryngopharynx which alter cricopharyngeal pressure

leading to swallowing of blood by the gastrointestinal tract causing irritation and increase PONV(Bennett & Emery, 2008).

Strabismus Surgery

PONV is the major cause of the morbidity after pediatric strabismus surgery. 41% to 88% is the occurrence of PONV without any prophylaxis after strabismus surgery. PONV after strabismus is the major cause of readmission and increasing the length of hospital stay (Sinha et al., 2016).

Afferent impulses trigger the oculo-chemical reflex conduit to increase the risk of POV, even afferent stimuli are transmitted from peripheral to central vomiting centers, also triggering of the area postrema over glossopharyngeal and vagal nerves, which helps to understand the cause and mechanism of PONV (Kovac, 2007).

2.1.4 Antiemetics for PONV

Ondansetron

Ondansetron is a 5-HT3 antagonist and it is contemplated to be one of the most secure antiemetic drugs for children and has an effect in preventing PONV, especially in combination with dexamethasone(Kovac, 2007). Intravenous ondansetron 0.05-0.15 mg / kg or oral ondansetron 0.1 mg / kg was found to be significantly more effective than placebo in the prevention of PONV in children undergoing tonsillectomy or strabismus repair. The prophylactic does 0.1 mg/kg of Ondansetron decreased the

PONV in pediatric patients disregarding of surgical or anesthesia factors and resulted in a shorter time to PACU (Kovac, 2007).

In children undergoing surgery, it was concluded that ondansetron 0.1 mg / kg and droperidol 0.075 mg / kg had the same antiemetic effect and were significantly more effective in comparison to placebo or metoclopramide 0.25 mg / kg. Prevention of PONV during the first 4 hours, ondansetron is contemplated effective ,chiefly after general anesthesia with lower sedation scores (Kovac, 2007).

Dexamethasone

Dexamethasone as prophylactic for PONV in randomized controlled trials demonstrated the effects of dexamethasone as an antiemetic compared to placebo without any clinical evidence of toxicity or adverse effects in patients, while the outstanding PONV prophylaxis when dexamethasone was mixed with 5-HT3 receptor antagonist (Kovac, 2007).

However, other studies report that when combined intravenous ondansetron 50 μg / kg with intravenous dexamethasone 150 μg / kg had a significant effect in decreasing PONV than drug alone (Kovac, 2007).

Metoclopramide

Metoclopramide is an antiemetic with multi model action (Aziz, Naz, & Ilyas, 2011). It acts on both central dopamine and serotonin receptors, with both prokinetic and antiemetic effects(Bryson, Frost, & Rosenblatt, 2007). Originally, metoclopramide was used for the treatment

of nausea and vomiting in migraine, radiotherapy and chemotherapy(Aziz et al., 2011) . Contemporary, it is used to reduce preoperative gastric contents and to treat, gastrointestinal reflux, heartburn, and gastroparesis (Norred, 2003).

Metoclopramide increments gastric emptying time by incrementing smooth muscle tension of the lower esophagus and stomach and relaxation of the pylorus and duodenum, also it minimizes the small intestinal transit time of ingested substances by cholinergic stimulation of the postganglionic nerves of the gastrointestinal tract. Moreover, it increments prolactin and aldosterone secretion but does not affect secretion of gastric hydrogen ion or pH (Norred, 2003).

In various PONV prophylactic studies, metoclopramide has been used as a comparative drug, and because it is a feeble antiemetic with a short half-life of only 30-45 minutes, its influence on PONV was finite (Kovac, 2007). It has approved that it is more effective when given at the end of anesthesia than when given at its induction (Nesek-Adam et al., 2007).

NK-1 receptor antagonists (Aprepitant.)

High half-life NK-1 receptor antagonists were effective for the prophylaxis and treatment of PONV. Granting all this, the combination of NK-1 receptor antagonist with Ondansetron may contribute more efficacies in reducing the occurrence of PONV. NK-1 receptor antagonist is

recommended for patients at high risk for PONV and for which PONV can cause negative results (Cao et al., 2017).

Droperidol

Droperidol is the greater cost effective antiemetic therapy, even supposing it applies to additional pyramidal side effects and potential for prolongation of the QT interval on the electrocardiograph when over dosage is overdosed, but the consolidation of droperidol with a 5-HT3 receptor antagonist decreases the risk significantly of QT prolongation as well-controlled randomized and comparative clinical trial reports (Cao et al., 2017).

Propofol

Combination of propofol infusion with dexamethasone intra-operative for children undergoing tonsillectomy contributes a better prophylaxis effects as prophylactic against PONV. In comparison with dexamethasone alone, In a randomized double-blinded study on 80 patients underwent tonsillectomy with or without adenoidectomy aged between 4-12 years old , all patients received 0.15 mg/kg dexamethasone and 2 μg/kg fentanyl after anesthesia, the treatment group obtained the propofol 1mg/kg before intubation and after intubation continues infusion at rate of 20 μg/kg/mint until the surgery was finished. The percentage of patients who experience complete response(defined as no retching or vomiting for 24 h) increased from 37.5% in the dexamethasone-alone group to 75% in the dexamethasone plus propofol group. Twenty-two patients (55%) in the

dexamethasone-alone and nine patients (22.5%) in the dexamethasone plus propofol groups experienced vomiting during 0–4 hours. These data endorsed that propofol had beneficial influence in reducing the PONV in pediatric patients (Erdem et al., 2008).

2.1.5 Non-pharmacological techniques

Transcutaneous electrical acupoint stimulation

Utilization of transcutaneous electrical acupoint stimulation for children under general anesthesia is painless, decisive and compelling method to prevent and treatment of PONV in pediatric tonsillectomy (Kabalak, Akcay, Akcay, & Gogus, 2005). Triggering of acupuncture points has been advertised effective in prophylactic and treatment of PONV. A randomized, controlled, prospective study was conducted on 90 children aged between 4-12 undergoing tonsillectomy under general anesthesia, they were equal randomly prorated into three groups; the 1st group electrically stimulated via surface electrodes on acupoints Neiguan and Shangwan, 2nd group received Ondansetron 0 .15mg/kg, and no treatment was given to the third group (control group) (Kabalak et al., 2005). The frequency of PONV and adverse effects was evaluated on the day of surgery in PACU, and on the surgical care unit. On the first day after surgery, the result showed significant difference between the treatment groups and the control group in the incidence of PONV in the first day in surgical care unit and also on the day after discharge and the satisfaction scores of the parents were greater (Kabalak et al., 2005).

Chapter Three

Literature Review

3.1 Literature review

Tonsillectomy, with or without adenoidectomy, is one of the greater common surgical intervention in children globally. PONV is the prevailing complication after tonsillectomy ,also, it is the main cause of hospital readmission and expansion of hospital time. When no antiemetic prophylactic is administered to the patients, the occurrence of POV swings up to 70% (Elgueta et al., 2012).

In 2016, a study was performed to investigate the influence of dextrose 5% on diminishing PONV in patients go through endoscopic middle ear surgery. The study was implemented on 90 patients, programmed for tympanoplasty under general anesthesia (Irkal et al., 2016). Participants were prorated into two groups; (n = 45), (group Control) received Ringer's lactate and (group Dextrose) 5% dextrose in Ringer's lactate after operation. The results showed that the dextrose group had 46.7% presence of PONV while control group had 62.2% presence of PONV, the variation in occurrence was not statistically significant (P = 0, 1434) while the average number of emetic events per participant in group C was 1.045 ± 0.42 and in group D was 0.133 ± 0.41. This variation was statistically significant (P = 0.0039). 25/45 patients (55.56%) in group C obtained anti-emetic ,whereas 15/45 patients (33.33%) in group D obtained antiemetic after operation, this variation being statistical significant (P = 0.0366). The mean dose of anti-emetics utilized in group C was 3.55 ± 4.19 mg and was 1.51 ± 1.96 mg in group D, this variation was statistically

significant (P = 0.0040). The mean time of PACU in group D was 139.67 ± 14.2 min, which was briefer related to 185.18 ± 13.39 min in group C patients, statistically this difference was significant (P <0.0001)(Irkal et al., 2016). As a consequence, administration of dextrose 5% reduced vomiting, need for antiemetic rescue medication and residence time in PACU but not nausea.

In 2013, a study was performed on 62 patients to evaluate the effect of dextrose 5% on reducing post-operative antiemetic need and PACU duration of stay. These patients prorated into two groups (n = 31) of each going through gynecological laparoscopic and hysteroscopic surgeries under general anesthesia (Dabu-Bondoc et al., 2013). (group C) obtains Ringer's lactate and (group D) 5% dextrose in Ringer's lactate. In the PACU, intra-operative fluid was terminated and each participant obtained 1 liter of assigned fluid for 30 minutes. The results showed that (46.7%) in the D5LR group had nausea in comparison to (62.5%) in the LR group, (P = 0.31), although (13.3%) . D5LR group had vomiting in comparison to (12.5%) LR group, P = 1.00) and (40.0%), in the D5LR group versus (56.3%). LR group required rescue antiemetic (P = 0.22). Patients ,. D5LR group had a briefer stay in PACU (148 ± 52 minutes) in comparison to that (184 ± 74 minutes) in patients in the LR group (P = 0.03) (Dabu-Bondoc et al., 2013). As a consequence, D5LR had no effect of diminishing nausea or vomiting without LOS.

A trial was implemented to assess the influence of IV dextrose oversee during emergence from anesthesia on PONV and duration of the PACU time and patients' satisfaction level. Patients went through gynecological, urological or breast surgery. The participants randomly prorated into two groups; group one (group P; n = 75) obtained 250 ml of lactated Ringer's and group two (group D; n = 87) obtained 250 ml of dextrose 5% in lactated Ringer over 2 hours starts with incision stoppage(Patel et al., 2013). PONV occurred all along the first two hours post anesthesia in 81 of 162 (50%) patients, likewise in group D (52.9%) and group P (46.7%; P = 0.53. Emesis episodes in a period of two hours post anesthesia occurred in 9 patients in group D (4.6%) and group P (6.7%; P = 0.73. There were no significant variations in the frequency of antiemetic doses or classes of medication disposed to manage of PONV. The results showed no significant variations in intensity of nausea at any time. 47 in group D (54.0%) and 38 in group P (50.7%) patients experienced nausea or emesis episodes at 24 hours after operation. As a consequence, the ultimate dose and timing for IV dextrose administration is still ambiguous and warrants more inquiry(Patel et al., 2013).

A study was performed to investigate the effect of infusing of IV dextrose after surgery on PONV. One hundred fifty patients go through laparoscopic surgery under general anesthesia. The patients were randomly prorated into two groups: the first group (N = 75) obtained 1L of 5% dextrose intravenous and the second group (N = 75) obtained 1L Ringer Lactate over 30-40 minutes after surgery in PACU (Rao, Bala, Jain, &

Bharti, 2017). All episodes of PONV (nausea, vomiting, retching) for 0-6 hours and 6-24 hours were noted. Blood glucose was tested before and after expiration of the infusion fluids, The results showed that the occurrence of nausea in the dextrose group was 30.3% Vs. 57.6% in the control group ($p = 0.041$) at 0-6 hours and (12.5% vs 18.6%, $p = 0.364$) at 6-24 hours and (42.8% vs. 72.8%, $p < 0.001$) at 0 -24 h. The occurrence of vomiting was 10.7% Vs. 11.8%, 3.5% Vs. 5% and 14.2% Vs. 16.9% at 0-6h, 6-24h and 0-24h in groups one and two. Group two needed greater doses of analgesics in comparison to group one between 0-24 h ($p = 0.042$) and group two had significantly greater rates of fatigue and hunger in comparison to group one (Jain et al., 2016).

In India, a study was implemented to test the effect of intra-operative intravenous dextrose 5% in patients envisaged for gynecological laparoscopy undergoing general anesthesia compared to normal saline at 86 patient. The patients were randomized into two groups, the first group ($n = 42$) obtained the dextrose fluid and the second group ($n = 44$) obtained normal saline as maintenance at an infusion amount of 2 ml / kg / hour. (35.7%) in the dextrose group developed PONV versus (31.8%) in normal saline ($p = 0.09$), greater antiemetic drug consumption in the dextrose group in comparison to normal saline group ($p = 0.04$), dextrose group had greater blood glucose levels assessed at pre-operative period, on arrival at recovery room and 120 minutes after emergence from anesthesia ($p = 0.006$, 0.000 and 0.008). The researchers found that dextrose fluidusage as a maintenance did not decrease the occurrence of PONV during the first 24

hours after anesthesia and incremented the requirements of antiemetic drugs and blood sugar rates (On, Boonsri, & Klanarong, 2016).

A study was performed to determine the effect of preoperative i.v. dextrose 5% on PONV in the participants envisaged for laparoscopic cholecystectomy in general anesthesia in 100 patients. Patients were randomly prorated into two groups. Intra-operative maintenance fluid obtained by the first group 250 ML of 0.9% normal saline and the second group obtained 5% dextrose at amount of 100 ml / hr. began at the time the gallbladder departure. The results showed that (28%) of the participants had an incidence of PONV in group D in comparison to (66%)in the control group within 24h of the operation (p-value 0.001) and the need of rescue antimetics in group D diminished by 26% in comparison to group NS (p-value 0.002). Furthermore, the result of this study showed that enhancement of the POVN handling explained by decreased use of rescue antiemetic need (Mishra et al., 2017).

A study was performed to investigate the effect of I.V. associated sodium lactate (SL) and dextrose on nausea, vomiting and pain after general anesthesia. One hundred twenty patients go through gynecological laparoscopy under general anesthesia randomly prorated into three groups; group (a) received IV- sodium lactate (SL) 1-1.5 ML / KG per hour , group (b)) received IV compound sodium lactate 1-1.5 ML / KG per hour with dextrose (SL / dextrose) and control group (c) no IV fluid. The results showed that in comparison to control, the percentage of patients who had

no PONV within 24 hours of anesthesia in SL and SL / dextrose 78% vs. 83% compared to C group 71%. The SL / dextrose group was more hyperglycemic than control or SL groups (P <0 , 0001) in PACU and SL / dextrose group given more fentanyl in PACU than the control group (46.7% versus 8.9%, P = 0.03). Thirst raised in the SL / dextrose group at 24 hours in comparison to control (P = 0.035). Also, the result showed that the application of dextrose is accompanied with nausea and increments opioid requirement and deferred thirst after gynecological laparoscopy(McCaul et al., 2003).

A study conducted through (Firouzian et al., 2017) in order to determine effect of I.V. dextrose application to prevent PONV after laparoscopic surgery (LC). 150 female patients were randomly prorated into two groups (A and B). Thirty minutes before induction of anesthesia, patients were given an infusion of 500 cc of lactated Ringer's (group A) and 5% of dextrose in lactated Ringer's (group B) for the period of 30 minutes. The results showed that there was a statistically significant variation between the groups for nausea and vomiting (P <0.05). A low negative correlation coefficient was found (r = -0.394, P <0.001) between blood sugar levels and nausea at the time of PACU landing. The authors wrapped up that adopted of I.V. dextrose before anesthesia induction can be recommended as an efficient and secure way of prophylaxis of PONV after LC.

In a systemic review, seven RCTs were included by Kim et al (2018). The purpose of the study was to compare dextrose fluid with non-dextrose fluid in terms of PONV for 24 hours after surgery under general anesthesia. The effects of dextrose based on various types of surgery and fluid volume were examined. The authors found that in comparison to the control group, the risk of PONV did not diminish with peri-operative dextrose application. Nonetheless, peri-operative dextrose decreased the requirement for anti-emetic in comparison to the control group. After sub-group analysis, the risk of PONV was diminished in patients who had underwent laparoscopic cholecystectomy and the effects of dextrose on the risk of PONV did not alter bestow to the volume of liquid given. As a consequence, Peri-operative intravenous (i.v.) dextrose did not decrease the risk of PONV. Nonetheless, it diminished the requirement for anti-emetics after general anesthesia. Furthermore, the effects of dextrose differed, building upon the type of surgery.

Summary and reflection on literature review (Annex 3)

It is especially noted that most studies were heterogeneous and they have variations in the results. In a systemic study by Kim et al. (2018), it was found that no evidence to support the routine use of perioperative dextrose as a prophylaxis of PONV in patients placed under general anesthesia.

The studies differ in time of giving dextrose, some of the studies provided preoperative, intra-operative and the other postoperative. There is no evidence at the appropriate time. Although the amount of fluids that have been given differs among the studies, there are no evidences of how much fluid should be given. In addition, the types of surgery are dulled among the studies. There is no study on the use of dextrose as prophylaxis for PONV neither in pediatric patients nor tonsillectomy.

Chapter Four

Methodology

4. Methodology

4.1 Study design

A prospective randomized double-blind clinical trial to investigate the role of I.V. dextrose 5% in decreasing PONV in children undergoing tonsillectomy with or without adenoidectomy in general anesthesia.

4.2 Site and setting

The study is performed in the operation room, PACU and pediatric surgical ward at An-Najah National University Hospital in the West Bank / Palestine.

4.3 Study population

Children, 4-12 years old, ASA physical status I and II, participants went through adeno / tonsillectomy during general anesthesia**.**

4.4 Inclusion criteria

1. ASA 1-II undergoing appointive tonsillectomy, with or without adenoidectomy under general anaesthesia

2. Utilization of sevoflorane inhalation agent.

3. Age between (4-12) year.

4. Males and females.

5. A simplified PONV risk score ≥30 % .

4.5 Exclusion criteria

1. History of diabetes mellitus.

2. History of heart failure

3. History of kidney failure

4. Currently, steroids get

5. Mental retardation.

6. Overweight (BMI ≥ 95th percentile for age and gender).

7. Intake of antiemetics within 24 hours before surgery.

8. Known gastro-esophageal reflux.

4.6 Sample and sampling

On the outside of antiemetic prophylaxis, a high percentage of children undergoing adeno/tonicillectomy have had at least one episode of postoperative vomiting (89% without prophylaxis) (Byers et al., 1995, Jensen et al., 2000, Hamid et al., 1998).The reported occurrence of PONV with 5% dextrose is 24% (Pandey et al, 2017) and with control being 89% (Byers et al., 1995, Jensen et al., 2000, Hamid et al, 1998). In another study, the occurrence of PONV in the participants of control group undergoing tonsillectomy is 62% (Pappas et al., 1998).

A formula (ie, Pocock's sample size formula) that can be applied to compare the percentage P1 and P2 in two equal groups: sample size is calculated in the control group as 60%, as the percentage differs between different studies.Thus, a total of 54 patients (28 for each group) should be directed towards recruitment in the study. According to the power analysis, 28 patients were recommended, of which 45 were recruited to take into account the risk of dropout.

4.7 Randomization

Randomization performed through hazy and well-locked envelopes; array generation is performed via computer. The number was written on the envelope and the group was written on the card in it along with the consecutive number, when the participant landed, the envelope was opened to see the group to be designated.

The participants were randomly prorated into two groups ,each of 45 patients. Each group was obtained either Ringer's Lactate (RL group) or 5% Dextrose Water (DW group).

RL -group: obtained 10 ml / kg lactated Ringer over 30 min when they landedin PACU. DW-group: obtained 10 ml / kg 5% dextrose water over 30 min when they landed in PACU.

4.8 Blindness

The participants and their guardians did not have any information about what type of intravenous fluid they got, the outcome evaluators were blinded as well. Intervention fluid bags were placed in consecutive numbered, locked, hazy, black plastic bags to obscure group drilling from the participants, anesthesia provider, PACU and pediatric surgical ward caregivers.

4.9 Study variables

4.9.1 Dependent Variable

1. Frequency of vomiting or retching
2. Incidence of nausea
3. Intensity of nausea
4. The frequency (percentage) of patients requesting rescue antiemetic
5. Incidence of Pain
6. Intensity of pain
7. The frequency (percentage) of patients requesting rescue analgesic
8. Incidence of drowsiness
9. Incidence of fatigue
10. Incidence of thirst
11. Incidence of hunger
12. Incidence of headache
13. Incidence of bleeding

4.9.2 Independent variables

Received of I.V. DW 5% versus RL after surgery as intervention.

4.10 Anesthesia protocol

All participants were fasted minimum 8 hours. In the theater room, participants were monitored with ECG, non-invasive blood pressure, pulse oximetry and capnograph. General anesthesia indoctrinated with Sevoflurane in 100% oxygen with facial mask with spontaneous ventilation. After induction, I.V access wasintersperse and before tracheal intubation, all patients got fentanyl 0.5-2 µg / kg / IV andpropofol 2.5-3.5 mg / kg and rocuronium 0.45-0.6 mg / kg. Anesthesia was handled with oxygen / nitroxide oxide (1: 1 liter / min) and 2% sevoflurane.

Further bolus doses of fentanyl 1 µg / kg were given to preserve heart rate within 20% of the baseline, the ventilation is controlled mechanically and adapted to maintain the end times of carbon dioxide between 35 and 40 mmHg. Every participant received dexamethasone 0.1mg/kg and perfalgan 15m/kg IV intra-operatively

Participants randomly designated by means of a table of computer generated random numbers in ordr to obtain one of the two fluids at the end of the operation. Each group got 10 ml / kg / h. Lactated ringer as a maintained intravenous fluid intra-operatively.

When the operation was finished, the anesthetic gas was closed and when the patients had their spontaneous breathing, the endotracheal tube

was taken out. At this time, the intraoperative fluid was terminated and the designated fluid was started, the control group (RL) obtained 10 ml of lactated Ringer for 30 minutes in the PACU while (Group DW) obtained 10 ml of kg of 5% dextrose for 30 minutes in PACU.

4.11 Study Procedure

Participants and their caregivers were given information of the study before surgery, consent and assent were obtained from each guardian and participant. If the risk for PONV regarding to Eberhart Risk Score was> 30%, patients were required to participate in the study. The participants were randomly prorated into two groups each of 45 participants through hazy and well-locked envelopes and sequential generation via computer.

Each group was obtained either Ringer Lactate (RL) (control group) or 5% dextrose (study group) when the operation was finished. RL group obtained 10 ml / kg lactated Ringer over 30 min in the PACU and DW group obtained 10 ml / kg 5% dextrose water for 30 min in PACU. During their rest in the PACU, vital signs such as blood pressure, heart rate, and respiratory rate were documented every 15 minutes and oxygen saturation was controlled constantly, oxygen (5 l / min) was given via facial mask and interrupted prior to depreciation to the ward.

The patients were transferred to the surgical department for further observation. If the patients had nausea ≥4 on VAS-N, or if patients were vomited twice, a rescue antiemetic of ondansetron 0.1 mg / kg IV was

administered. Also, if the patients complained of pain and the pain result is ≥4 on VAS-P, morphine 0.03 mg / kg was administered I.V.

4.12 Data collection

Evaluation of nausea was implemented using a nausea scale of 0 to 10 with 6 faces (Baxter Retching Faces [BARF] scale). The BARF scale was approved in patients with nausea in emergency departments and in healthy patients undergoing day surgery. The patients are presented with visual analogue scales for nausea The cut-off point is ≥4 on the VAS scale as:

0-1 (no nausea)

1 +/- 4 (mild)

4 +/- 7 (moderate)

7 +/- 10 (difficult).

Patients were requested to evaluate their nausea on landing and hourly until released from the PACU, vomiting was observed by the nurses, as well as the need for antiemetic when the patient was vomited twice and upward retching was classified along with vomiting. Patients obtained rescue antiemetic when the score ≥4, first line rescue medication was contained (in the following order of administration) I.V, ondansetron 0.1 mg / kg. If the first rescue drug was ineffective, patients were given IV

dexamethasone 0.1 mg / kg, or kept overnight if they are refractory to therapy.

The patient's pain was evaluated by a global pain assessment tool, of which 0 is "no pain" and " 10" the most intense pain that can be imagined".

During the operation, children obtained IV acetaminophen, 15 mg / kg and the patients obtained rescue medication when the score ≥4, the first line rescue drug is morphine 0.03 mg / kg. The VAS scale used as:

0 (no pain),

1 +/- 4 (mild),

4 +/- 7 (moderate)

7 +/- 10 (difficult)

Patients were asked to evaluate their pain on arrival and hourly until released from PACU. Pain was documented by the nurses, as well as the need for rescue medication. Also, pain was recorded at the time of release from the PACU until patient discharge from the hospital at which the study was terminated at this time.

4.13 Assessment of postoperative symptoms

Each participant was interrogated by a blind evaluator after surgery. The data sheet includes demographic information about (gender, age, weight, height, BMI, age, PONV's history of the

participants and their families, and risk of PONV), and it also includes medications that have been utilized during anesthesia.

Data sheet (Annex I) on assessment of postoperative symptoms were voted in, based on data sheets used in earlier studies of PONV. The patients were first inquired if they had experienced a number of symptoms reported after surgery (nausea / vomiting, pain, headache, drowsiness, fatigue, bleeding, thirst, and hunger). Then, at the end of each evaluation of postoperative symptoms, there is an open question, patients were required to report if they experienced any other symptoms. Participants were requested to answer if they recommend the use of intravenous dextrose to prevent postoperative nausea and vomiting to other patients undergoing surgery. They were also asked about their satisfaction of PONV management.

4.14 Timing of intervention

Immediately after the end of the operation, the control group (RL) obtained 10 ml/ kg of lactated Ringer, while group (DW) obtained 10 ml/ kg of 5% dextrose water over 30 min in PACU.

4.15 Ethical consideration

The study was accredited by the Institutional Review Board (IRB) of An-Najah National University and the Ethics Committee of An-Najah National University Hospital where the study was done. The study pursued

the World Health Organization Declaration on the Ethical Principles of Helsinki for Human Medical .

Participants and their guardians requested to permit their assent and consent respectively, and they were indoctrinated that participation and information afforded would only be utilized for research direction. The patients were convinced of protecting their namelessness and covertness. All participants were free to voluntarily withdraw from the study at any time without any response.

4.16 Statistical analysis

Data is analyzed with SPSS version 20. The statistical methods used in the analysis of the research were:

1. Frequencies and percentages for describing qualitative personal and demographic variables.

2. Mean ± S.D to describe quantitative personal and demographic variables.

3. Chi Square test to study the differences in proportions between the two study groups among the collected indicators by time steps (30 minutes and one hour intervals up to 5 hours after surgery and at hospital discharge).Mann-Whitney U test and paired sample T test were used, and

4. The P value of <0.05 is regarded significant.

Chapter Five

Analysis and Results

Results

A total of 100 patients referred to our hospital for tonsillectomy / adenoidectomy surgery were screened during the study period. Of these, 10 patients did not meet the inclusion criteria. Of the 90 patients assigned equal to one of the two groups, 45 (Group DW, the intervention group) and 45 (group RL, the control group). Data were analyzed for all 90 patients who completed the study (Figure 1, Consort flow diagram).

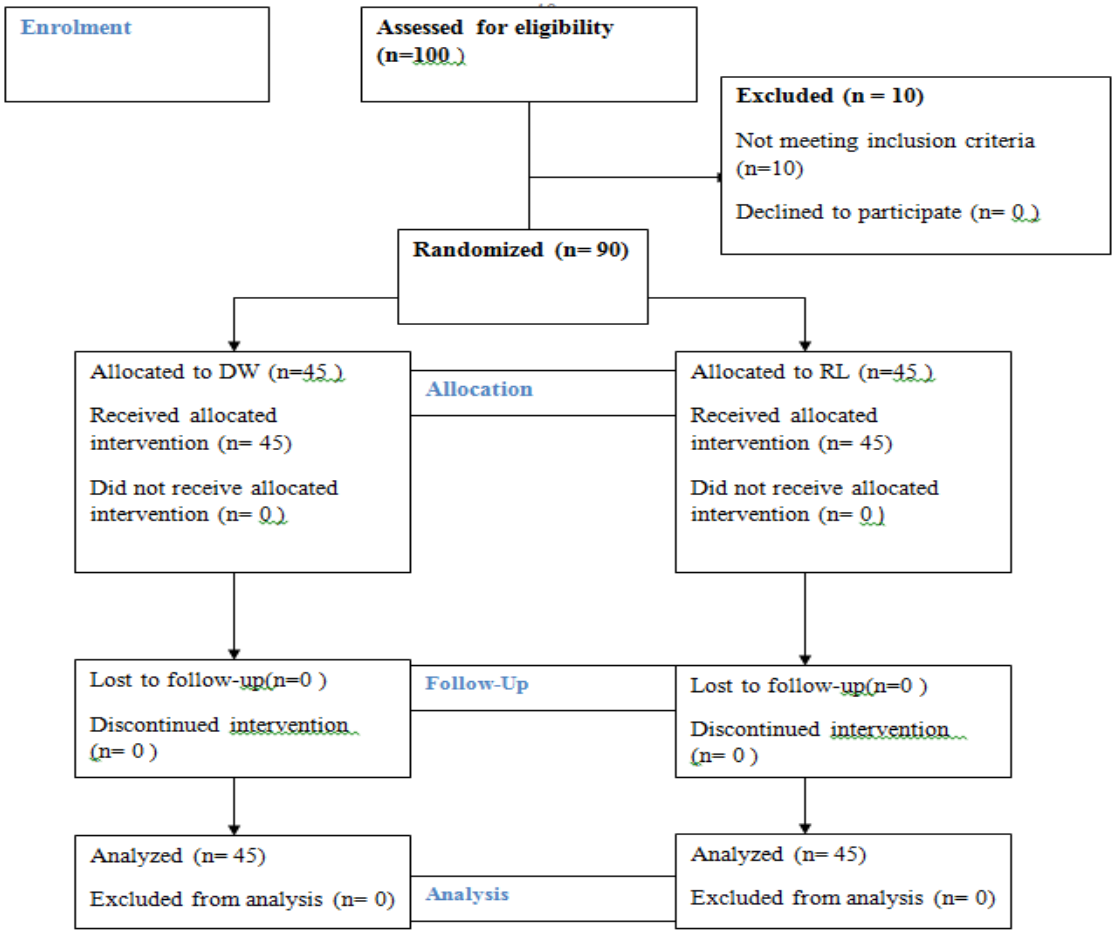

Figure 1:CONSORT Flow Diagram of pediatric patient enrolment and assignment to the two groups, the DW group and the RL group

5.1 Patients Characteristics and Operative Information.

The following tables show descriptive statistics (frequencies, percentages, means and standard deviations) for the Demographic and Personal variables, Intra-operative variables, and total Intra-operative drugs:

Table (1): Frequencies, Percentages, Means, Standard Deviations of Demographic and Personal variables in DW and RL groups

Variable	category	DW (Dextrose Water) N=45		RL (Ringer lactate) N=45		P-value*
		n(%)	Mean±S.D	n(%)	Mean±S.D	
Gender	Male	28(62.2%)		27(60.0%)		0.829
	Female	17(37.8%)		18(40.0%)		
Age (year)			5.33±1.93		5.93±1.90	0.083
Weight (Kg)			22.69±5.72		24.29±6.55	0.240
Height (Cm)			113.07±11.64		116.60±14.86	0.135
BMI-for-age percentiles			17.54±1.26		17.63±1.31	0.783

* P-values for (Gender, Place) based on Chi Square test. P-values for (Age, Weight, Height, BMI) based on Mann-Whitney U test.

Demographic data of the patients in DW (n=45) and RL (n=45) groups are presented in Table 1. None of the differences in the demographic categories were statistically significant (P > 0.05). Demographic data were comparable between the two groups. (Table 1).

Table (2):Frequencies, Percentages, means, standard deviations of intra-operative variables (type of surgery, anesthesia time, operation time) in DW and RL groups

Variable	category	DW (Dextrose Water) N=45		RL (Ringer lactate) N=45		P-value*
		n(%)	Mean±S.D	n(%)	Mean±S.D	
Operation type	Tonsillectomy	23(51.1%)		14(31.1%)		0.054
	Adenotonsillectomy	22(48.9%)		31(68.9%)		
Anesthesia time (Min)			33±3		34±3	0.076
Operation time (Min)			28±3		28±3	0.129

* P-values for (Operation type) based on Chi Square test. P-values for (Anesthesia time, Operation time) based on Mann-Whitney U test.

Clinical characteristics of DW and RL groups are presented in Table 2. There were no significant differences in the clinical characteristics that are type of operation; anesthesia and surgery times (P > 0.05).

Table (3): Means and standard deviations of total Intra-operative drugs in DW and RL groups

Variable	DW (Dextrose Water) N=45	RL (Ringer lactate) N=45	P-value*
	Mean±S.D	Mean±S.D	
Total Fentanyl/µg	28.78±10.83	29.67±11.65	0.952
Total Propofol/mg	78.36±21.36	85.18±23.06	0.166
Total Rocuronium/mg	12.33±3.38	13.44±4.07	0.324
Total dexamethasone/mg	2.26±0.56	2.44±0.66	0.215
Total perfalgan/mg	340.33±85.80	361.89±100.22	0.339

* all P-values are based on Mann-Whitney U test.

Intra operative drugs used in DW and RL groups are presented in Table 3. None of the differences in the intraoperative drugs that are (fentanyl, propofol, recuronium, dexamethasone and perfalagan) were statistically significant between the two groups (P > 0.05).

Table (4): Means and standard seviations for total IV fluids and total calories of postoperative IV fluids in DW and RL groups

Variable	DW (Dextrose Water) N=45	RL (Ringer lactate) N=45	P-value
	Mean±S.D	Mean±S.D	
Total IV fluid volume (ml)	299.89±57.20	242.89±65.53	0.756
Total calories	45.38±11.44	2.19±0.59	.000

All P-values are based on paired sample T test.

There is no significant difference in the total IV fluids between the two groups but there is a significant difference in the Mean±S.D of total calories between the dextrose group 45.38±11.44 and RL 2.19±0.59, p=0.000 (Table4).

5.2 Postoperative Nausea and vomiting

5.2.1 Incidence and intensity of nausea

Table (5): Incidence of Nausea on 30 min, one hour interval up to 5 hr, on discharge and all over study period (0-5 hr.)in DW and RL groups. Date are presented as Frequencies, percentages and Chi Square test was used

Question	Option	DW n(%)	RL n(%)	Chi-square	P-value
Incidence of nausea (30 mints after OP)	YES	3(6.7%)	26(57.8%)	26.914	.000*
	NO	42(93.3%)	19(42.2%)		
Incidence of nausea (1 hr. after OP)	YES	7(15.6%)	21(46.7%)	10.161	.001*
	NO	38(84.4%)	24(53.3%)		
Incidence of nausea (2 hr. after OP)	YES	9(20%)	11(24.4%)	0.257	0.612
	NO	36(80%)	34(75.6%)		
Incidence of nausea (3 hr. after OP)	YES	6(13.3%)	6(13.3%)	0.000	1.000
	NO	39(86.7%)	39(86.7%)		
Incidence of nausea (4 hr. after OP)	YES	2(4.4%)	0(0%)	2.045	0.153
	NO	43(95.6%)	45(100%)		
Incidence of nausea (5 hr. after OP)	YES	0(0%)	0(0%)	—	—
	NO	45(100%)	45(100%)		
Incidence of nausea (At Discharge)	YES	2(4.4%)	8(17.8%)	4.050	0.044*
	NO	43(95.6%)	37(82.2%)		
Incidence of nausea(Overall)	YES	22(48.9%)	35(77.8%)	8.086	0.004*
	NO	23(51.1%)	10(22.2%)		

* Significant at 0.05 level.

On 30 min postoperatively, there is a significant difference in the incidence of nausea in group (DW) 3(6.7%) compared to group (RL) 26(57.8%), p = 0.000 (Table 5).

On 1 hr. postoperatively, there is a significant difference in the incidence of nausea in group (DW) 7(15.6%) compared to group (RL) 21(46.7%), p=0.001(Table 5).

There is a significant difference in the incidence of nausea at discharge from the hospital between DW group 2(4.4%) compared to RL group 17.8%, p= 0.044 (Table 5).

The overall incidence of nausea (0-5 hr) was significantly lower in DW group 23(48.9%) compared to the RL group 35(77.8%), p= 0.004. (Table5).

The results indicate that 5% DW administered postoperatively reduces the incidence of nausea postoperatively at 30 min, one hour, on discharge from the hospital and throughout the allover period (0-5hr). There were no significant differences between the two groups in the other time intervals (Figure 1)

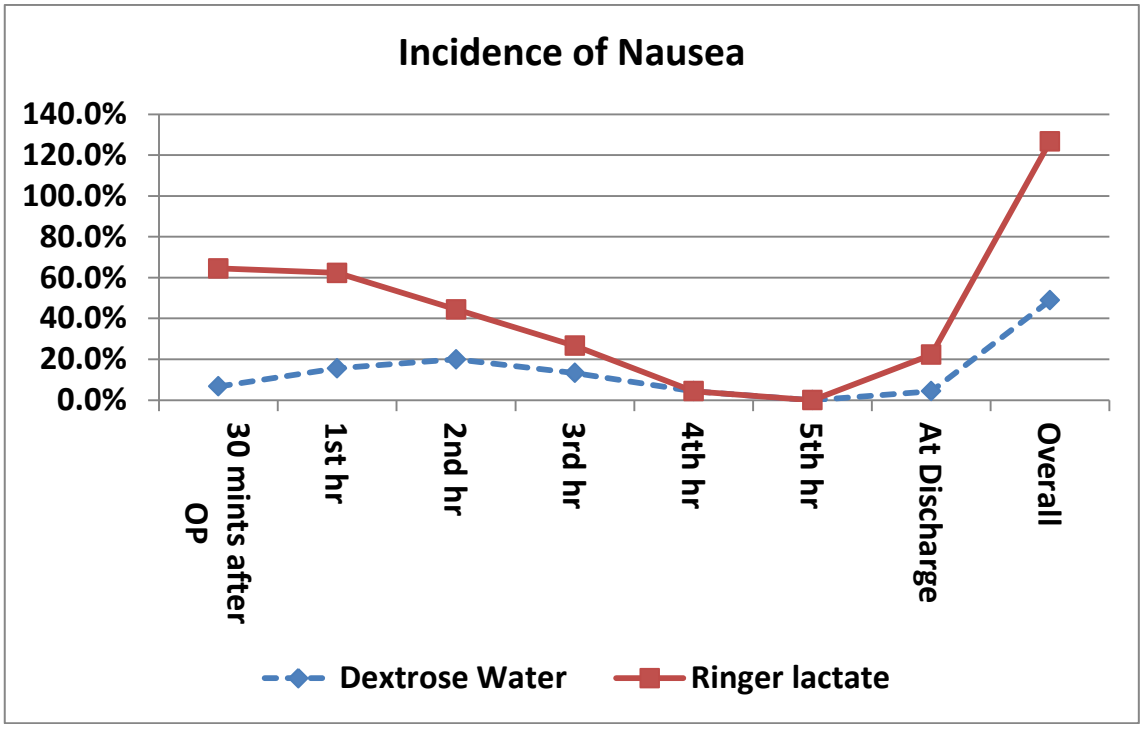

Figure 2. Incidence of nausea postoperatively throughout the period (0-5 hours, at discharge and overall).

Table (6): Intensity of Nausea postoperatively assessed by using VAS-N throughout the period (0-5 hours) in DW and RL groups. Data are presented as M±S.D **and analyzed by T-test**

Question	DW M±S.D	RL M±S.D	t	P-value
Intensity of nausea by using VAS-N: 30 mints after OP	0.27±0.81	1.6+1.57	-5.058	0.000*
Intensity of nausea by using VAS-N: 1 hr. after OP.	0.31±0.73	1.07+1.25	-3.497	0.001*
Intensity of nausea by using VAS-N: 2 hr. after OP.	0.44±1.03	0.62+1.19	-0.755	0.452
Intensity of nausea by using VAS-N: 3 hr. after OP.	0.36±0.98	0.27+0.69	0.498	0.620
Intensity of nausea by using VAS-N: 4 hr. after OP	0.18±0.83	0+0	1.431	0.156
Intensity of nausea by using VAS-N: 5 hr. after OP	0±0	0+0	___	___
Intensity of nausea by using VAS-N: At Discharge	0.04±0.3	0.4+0.91	-2.480	0.015*
Intensity of nausea by using VAS-N: Overall	0.23+0.29	0.57+0.41	-4.524	0.000

* Significant at 0.05 level.

At 30 minutes postoperatively, M±S.D of VAS-N scale in the DW group (0.27+0.81) is significantly lower than the RL group (1.6+1.57), p=0.000. (Table 6).

At one hour postoperatively, M±S.D of VAS-N scale in the DW group (0.31±0.73) is significantly lower than the RL group 1.07+1.25, p=0.001. (Table 6).

At discharge from the hospital, M±S.D of VAS-N scale in the DW group (0.04±0.3) is significantly lower than the RL group (0.4+0.91), p=0.015 (Table 6).

The results indicate that 5% DW administered postoperatively reduces the intensity of nausea at 30 min, one hour, on discharge from the hospital. There were no significant differences between the two groups in the other time intervals.

5.2.2 Incidence and frequency of vomiting

Table (7): Incidence of vomiting throughout the period (0-5 hours) in DW and RL groups. Data are presented as frequencies, percentages and analyzed by Chi Square test

Question	Option	DW n(%)	RL n(%)	Chi-square	P-value
Incidence of vomiting(30 mints after OP.)	YES	1(2.2%)	6(13.3%)	3.873	0.049*
	NO	44(97.8%)	39(86.7%)		
Incidence of vomiting (1 hr. after OP.)	YES	0(0%)	3(6.7%)	3.103	0.078
	NO	45(100%)	42(93.3%)		
Incidence of vomiting (2 hr. after OP.)	YES	1(2.2%)	2(4.4%)	0.345	0.557
	NO	44(97.8%)	43(95.6%)		
Incidence of vomiting (3 hr. after OP.)	YES	2(4.4%)	0(0%)	2.045	0.153
	NO	43(95.6%)	45(100%)		
Incidence of vomiting (4 hr. after OP.)	YES	2(4.4%)	0(0%)	2.045	0.153
	NO	43(95.6%)	45(100%)		
Incidence of vomiting (5 hr. after OP.)	YES	0(0%)	1(2.2%)	1.011	0.315
	NO	45(100%)	44(97.8%)		
Incidence of vomiting (At Discharge)	YES	0(0%)	1(2.2%)	1.011	0.315
	NO	45(100%)	44(97.8%)		
Incidence of vomiting(Overall period, 1-5 hr)	YES	6(13.3%)	12(26.7%)	2.500	0.114
	NO	39(86.7%)	33(73.3%)		

* Significant at 0.05 level.

At 30 min postoperatively, there is a significant difference in the incidence of vomiting in group (DW) 1(2.2%) compared to group (RL) 6(13.3%, p = 0.049 (Table 7).

The results indicate that 5% DW administered postoperatively reduces the incidence of vomiting at 30 min only. There were no significant differences between the two groups at the other time intervals (Figure 2)

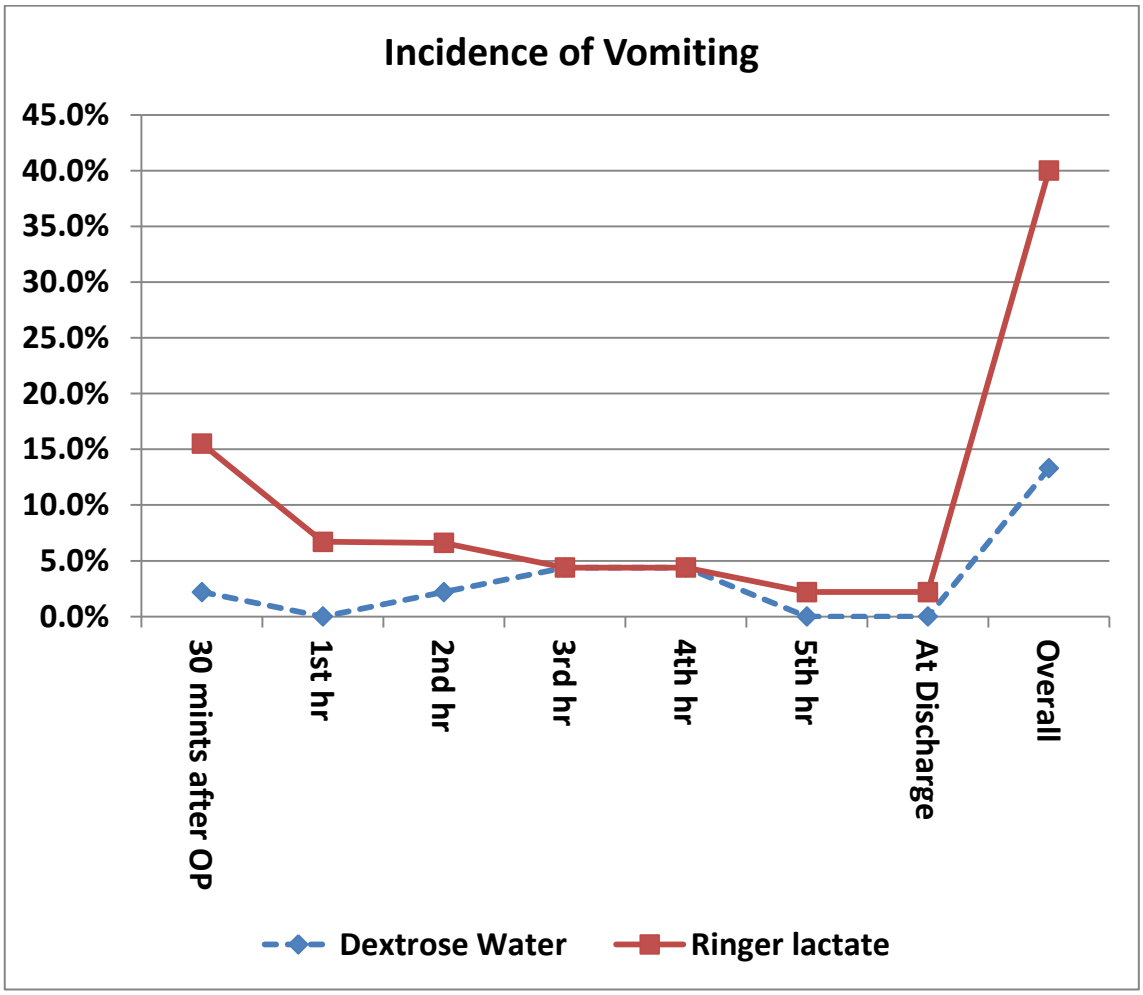

Figure 3: Incidence of vomiting post -operatively throughout the overall study period (0-5 hours, at discharge and overall).

5.3 Rescue Medications

Table (8): Patients who were postoperatively required rescue medication of ondansetron 0.1mg/kg. Data are presented as frequencies, percentages and analyzed by Chi Square test in DW and RL groups

Question	Option	DW n(%)	RL n(%)	Chi-square	P-value
Ondansetron 0.1 mg/kg 30 mints after OP.	YES	1(2.2%)	10(22.2%)	8.389	.004*
	NO	44(97.8%)	35(77.8%)		
Ondansetron 0.1 mg/kg 1 hr. after OP.	YES	0(0%)	3(6.7%)	3.103	0.078
	NO	45(100%)	42(93.3%)		
Ondansetron 0.1 mg/kg 2 hr. after OP.	YES	2(4.4%)	3(6.7%)	0.212	0.645
	NO	43(95.6%)	42(93.3%)		
Ondansetron 0.1 mg/kg 3 hr. after OP.	YES	2(4.4%)	0(0%)	2.045	0.153
	NO	43(95.6%)	45(100%)		
Ondansetron 0.1 mg/kg 4 hr. after OP.	YES	2(4.4%)	0(0%)	2.045	0.153
	NO	43(95.6%)	45(100%)		
Ondansetron 0.1 mg/kg 5 hr. after OP.	YES	0(0%)	0(0%)	—	—
	NO	45(100%)	45(100%)		
Ondansetron 0.1 mg/kg at Discharge	YES	0(0%)	1(2.2%)	1.011	0.315
	NO	45(100%)	44(97.8%)		
Ondansetron 0.1 mg/kg throughout the overall study period (0-5 hours).	YES	7(15.6%)	17(37.8%)	5.682	.017*
	NO	38(84.4%)	28(62.2%)		

* Significant at 0.05 level.

At 30 min postoperatively, the number (%) of patients who required rescue medication in DW group 1(2.2%) is significantly lower than the RL group 10(22.2%), p=0.004. (Table 8).

The number (%) of patients who required rescue medication throughout the period (0-5 hours) in DW group 7(15.6%) is significantly lower than the RL group 17(37.8%), p=004. (Table 8).

The results indicate that 5% DW administered postoperatively reduces the consumption of rescue antiemetic medication at 30 min and throughout the all over study period (0-5 hours). There were no significant differences between the two groups at the other time intervals (Figure 3)

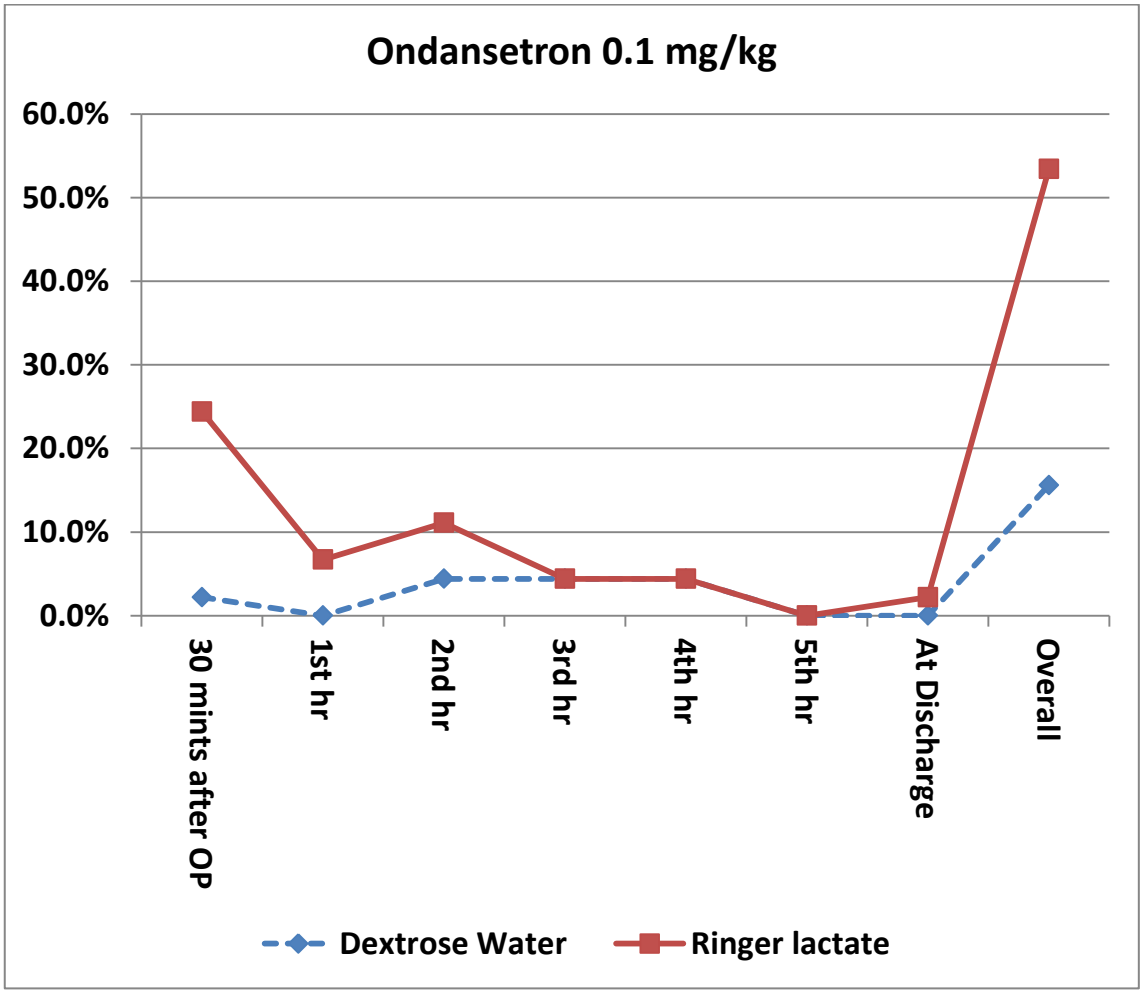

Figure 4: The requirement of rescue medication of Ondansetron throughout the period (0-5 hours, at discharge and overall).

5.4 Complete response

Table(9): Patients with complete response, nausea only, vomiting only, nausea and vomiting together, and need for rescue medication (Ondansetron) in DW and RL groups. Data are presented as frequencies, percentages and analyzed by Chi Square test.

Question	Option	DW n(%)	RL n(%)	Chi-square	P-value
Complete response(no nausea, no vomiting, no need for rescue medication)	YES	23(51.1%)	10(22.2%)	8.086	0.004*
	NO	22(48.9%)	35(77.8%)		
Nausea only	YES	16(35.6%)	23(51.1%)	2.217	0.136
	NO	29(64.4%)	22(48.9%)		
Vomiting only	YES	0(0%)	0(0%)	——	——
	NO	45(100%)	45(100%)		
Nausea and vomiting together	YES	6(13.3%)	12(26.7%)	2.500	0.114
	NO	39(86.7%)	33(73.3%)		
Need for rescue medication (Ondansetron)	YES	7(15.6%)	17(37.8%)	5.682	0.017*
	NO	38(84.4%)	28(62.2%)		

* Significant at 0.05 level.

The results revealed that the number (%) of patients with complete response in DW group 23(51.1%) is higher than in RL group 10(22.2%), p= 0.004. The number (%) of patients needed rescue medication in DW group 7(15.6%) is rather lower than in RL group 17(37.8%), p= 0.004. (Table 9).

On the other hand, the results show that there were no significant differences at 0.05 level between DW group and RL group in Nausea only (without Vomiting) and in Nausea and vomiting together since the P-values were greater than 0.05 level (table 9).

5.5 Incidence and intensity of pain

Table (10): Incidence of pain on the area of surgery postoperatively (0-5 hr.) in DW and RL groups. Data are presented as frequencies, percentages and analyzed by Chi Square test

Question	Option	DW n(%)	RL n(%)	Chi-square	P-value
pain on the area of surgery (30 mints after OP.)	YES	19(42.2%)	29(64.4%)	4.464	0.035*
	NO	26(57.8%)	16(35.6%)		
pain on the area of surgery(1 hr, after OP.)	YES	16(35.6%)	20(44.4%)	0.741	0.389
	NO	29(64.4%)	25(55.6%)		
pain on the area of surgery(2 hr. after OP.)	YES	12(26.7%)	15(33.3%)	0.476	0.490
	NO	33(73.3%)	30(66.7%)		
pain on the area of surgery(3 hr. after OP.)	YES	1(2.2%)	1(2.2%)	0.000	1.000
	NO	44(97.8%)	44(97.8%)		
pain on the area of surgery(4 hr. after OP.)	YES	0(0%)	0(0%)	—	—
	NO	45(100%)	45(100%)		
pain on the area of surgery(5 hr. after OP.)	YES	2(4.4%)	0(0%)	2.045	0.153
	NO	43(95.6%)	45(100%)		
pain on the area of surgery(At Discharge)	YES	0(0%)	0(0%)	—	—
	NO	45(100%)	45(100%)		
pain on the area of surgery(Overall period 0-5 hr.)	YES	34(75.6%)	39(86.7%)	1.813	0.178
	NO	11(24.4%)	6(13.3%)		

* Significant at 0.05 level.

There was a significant difference in the incidence of pain on the area of surgery postoperatively between DW group 19(42.2%) and RL group 29(64.4%), p=0.035. There were no significant differences between the both groups in the incidence of pain on the other time intervals. (Table 10)

5.6 Analgesic requirements

Table (11): Patients who required analgesic rescue medication (morphine 0.03 mg/kg) postoperatively (0-5 hr.) in DW and RL groups. Data are presented as frequencies, percentages and analyzed by Chi Square test

Question	Option	DW n(%)	RL n(%)	Chi-square	P-value
Analgesic (morphine 0.03 mg/kg) 30 mints after OP.	YES	0(0%)	4(8.9%)	4.186	0.041*
	NO	45(100%)	41(91.1%)		
Analgesic (morphine 0.03 mg/kg) 1 hr. after OP.	YES	1(2.2%)	0(0%)	1.011	0.315
	NO	44(97.8%)	45(100%)		
Analgesic (morphine 0.03 mg/kg) 2 hr. after OP.	YES	2(4.4%)	0(0%)	2.045	0.153
	NO	43(95.6%)	45(100%)		
Analgesic (morphine 0.03 mg/kg) 3 hr. after OP.	YES	0(0%)	0(0%)	—	—
	NO	45(100%)	45(100%)		
Analgesic (morphine 0.03 mg/kg) 4 hr .after OP.	YES	0(0%)	0(0%)	—	—
	NO	44(100%)	45(100%)		
Analgesic (morphine 0.03 mg/kg) 5 hr. after OP.	YES	0(0%)	1(2.2%)	0.989	0.320
	NO	44(100%)	44(97.8%)		
Analgesic (morphine 0.03 mg/kg) At Discharge	YES	0(0%)	0(0%)	—	—
	NO	45(100%)	45(100%)		
Analgesic (morphine 0.03 mg/kg) Overall period, 0-5 hr.	YES	3(6.7%)	5(11.1%)	0.549	0.459
	NO	42(93.3%)	40(88.9%)		

* Significant at 0.05 level.

The results of the table (11) show that there is a significant difference at 0.05 level in percentages of patients who needed rescue analgesic at 30 minutes after operation between DW group 0(0%) and RL group 4(8.9%) p=0.041). There were no significant differences between the groups in percentages of patients who needed rescue analgesic on the other time intervals. (Table 11)

5.7 Postoperative Symptoms

Table (12): Incidence of headache in DW and RL groups postoperatively (0-5 hr.). Data are presented as frequencies, percentages and analyzed by Chi Square test.

Question	Option	DW n(%)	RL n(%)	Chi-square	P-value
headache(30 mints after OP)	YES	0(0%)	0(0%)	—	—
	NO	45(100%)	45(100%)		
Headache (1 hr. after OP)	YES	0(0%)	1(2.2%)	1.011	0.315
	NO	45(100%)	44(97.8%)		
Headache (2 hr. after OP)	YES	0(0%)	5(11.1%)	5.294	0.021*
	NO	45(100%)	40(88.9%)		
Headache (3 hr. after OP)	YES	0(0%)	0(0%)	—	—
	NO	45(100%)	45(100%)		
Headache (4 hr. after OP)	YES	0(0%)	0(0%)	—	—
	NO	45(100%)	45(100%)		
Headache (5 hr. after OP)	YES	0(0%)	0(0%)	—	—
	NO	45(100%)	45(100%)		
Headache (At Discharge)	YES	0(0%)	0(0%)	—	—
	NO	45(100%)	45(100%)		
Headache (Overall period, 0-5 hr.)	YES	0(0%)	6(13.3%)	6.429	0.011*
	NO	45(100%)	39(86.7%)		

* Significant at 0.05 level.

The incidence of headache at 2hrs in the DW group (0%(0)) is significantly lower compared to the RL group 5(11.1%), P= 0.0. , Likewise , the incidence of headache overall period (0-5 hr.) in the DW group (0%(0)) is significantly lower compared to RL group 6(13.3%), p= 0.011. There were no significant differences between the two groups in the incidence of headache at other time intervals (Table 13). The results indicate that postoperative dextrose administration reduces postoperative headache.

Table (13): Incidence of Drowsiness/dizziness in DW and RL groups postoperatively (0-5 hr.). Data are presented as frequencies, percentages and analyzed by Chi Square test.

Question	Option	DW n(%)	RL n(%)	Chi-square	P-value
Drowsiness (30 mints after OP)	YES	5(11.1%)	16(35.6%)	7.516	.006*
	NO	40(88.9%)	29(64.4%)		
Drowsiness (1 hr. after OP)	YES	3(6.7%)	19(42.2%)	15.401	.000*
	NO	42(93.3%)	26(57.8%)		
Drowsiness (2 hr after OP)	YES	0(0%)	8(17.8%)	8.780	0.003*
	NO	45(100%)	37(82.2%)		
Drowsiness (3 hr. after OP)	YES	1(2.2%)	1(2.2%)	0.000	1.000
	NO	44(97.8%)	44(97.8%)		
Drowsiness (4 hr. after OP)	YES	1(2.2%)	0(0%)	1.011	0.315
	NO	44(97.8%)	45(100%)		
Drowsiness (5 hr. after OP)	YES	0(0%)	0(0%)	—	—
	NO	45(100%)	45(100%)		
Drowsiness (At Discharge)	YES	0(0%)	3(6.7%)	3.103	0.078
	NO	45(100%)	42(93.3%)		
Drowsiness (Overall period, 0-5 hr.)	YES	8(17.8%)	36(80%)	34.862	.000*
	NO	37(82.2%)	9(20%)		

* Significant at 0.05 level.

The number of patients with drowsiness at 30 min. after operation in the DW group 5(11.1%) is significantly lower than the RL group 16(35.6%), p= 0.006, and number of patients with drowsiness at 1hr. after operation in the DW 3(6.7%) is significantly lower than the RL group 19(42.2%), P= 0.000. Like some, the number of patients with drowsiness at 2 hr. after operation in the Dw 0(0%) is significantly lower than RL group 8(17.8%), p=- 0.003 (Table 14).

In the overall period (0-5 hr.), the number of patients with drowsiness in the RL group 36(80%) is significantly higher than the DW group 8(17.8%), p= 0.000. There were no significant differences between the two groups in the incidence of drowsiness/dizziness at other time intervals. (Table 14). The results indicate that administration of dextrose postoperatively reduces postoperative drowsiness.

Table (14): Incidence of fatigue in DW and RL groups postoperatively (0-5 hr). Data are presented as frequencies, percentages and analyzed by Chi Square test.

Question	Option	DW n(%)	RL n(%)	Chi-square	P-value
Fatigue (30 mints after OP.)	YES	3(6.7%)	10(22.2%)	4.406	0.036*
	NO	42(93.3%)	35(77.8%)		
Fatigue (1 hr. after OP.)	YES	0(0%)	4(8.9%)	4.186	0.041*
	NO	45(100%)	41(91.1%)		
Fatigue (2 hr. after OP.)	YES	4(8.9%)	4(8.9%)	0.000	1.000
	NO	41(91.1%)	41(91.1%)		
Fatigue (3 hr. after OP.)	YES	2(4.4%)	1(2.2%)	0.345	0.557
	NO	43(95.6%)	44(97.8%)		
Fatigue (4 hr. after OP.)	YES	0(0%)	4(8.9%)	4.186	0.041*
	NO	45(100%)	41(91.1%)		

Fatigue (5 hr. after OP.)	YES	1(2.2%)	3(6.7%)	1.047	0.306
	NO	44(97.8%)	42(93.3%)		
Fatigue (At Discharge)	YES	0(0%)	0(0%)	—	—
	NO	45(100%)	45(100%)		
Fatigue (Overall period, 0-5 hr.)	YES	10(22.2%)	18(40%)	3.318	0.069
	NO	35(77.8%)	27(60%)		

* Significant at 0.05 level.

At 30 minutes postoperatively, the incidence of fatigue in the DW group 3(6.7%) is significantly lower than in the RL group 10(22.2%), p=0.036. and at one hour the incidence of fatigue in the DW group 0(0%) is significantly lower than in the RL group 4(8.9%), p=0.041. Likewise, at 4 hours postoperatively, the incidence of fatigue in the DW group 0(0%) is significantly lower than in the RL group 4(8.9%), p=0.041. There were no significant differences between the two groups in the incidence of fatigue at other time intervals. (Table 15). The results indicate that administration of postoperative dextrose reduces postoperative fatigue.

Table (15): Incidence of thirst in DW and RL groups postoperatively (0-5 hr.). Data are presented as frequencies, percentages and analyzed by Chi Square test.

Question	Option	DW n(%)	RL n(%)	Chi-square	P-value
Thirst (30 mints after OP.)	YES	0(0%)	0(0%)	—	—
	NO	45(100%)	45(100%)		
Thirst (1 hr. after OP.)	YES	1(2.2%)	0(0%)	1.011	0.315
	NO	44(97.8%)	45(100%)		
Thirst (2 hr. after OP.)	YES	0(0%)	2(4.4%)	2.045	0.153
	NO	45(100%)	43(95.6%)		
Thirst (3 hr. after OP.)	YES	4(8.9%)	11(24.4%)	3.920	.048*
	NO	41(91.1%)	34(75.6%)		

Thirst (4 hr. after OP.)	YES	4(8.9%)	26(57.8%)	24.200	.000*
	NO	41(91.1%)	19(42.2%)		
Thirst (5 hr. after OP.)	YES	6(13.3%)	8(17.8%)	0.338	0.561
	NO	39(86.7%)	37(82.2%)		
Thirst (At Discharge)	YES	1(2.2%)	7(15.6%)	4.939	0.026*
	NO	44(97.8%)	38(84.4%)		
Thirst (Overall period, 0-5 hr.)	YES	13(28.9%)	38(84.4%)	28.281	0.000*
	NO	32(71.1%)	7(15.6%)		

* Significant at 0.05 level.

The number (percentage) of patients with thirst at 3 hr. after operation in the DW group 4(8.9%) is significantly lower than the RL group 11(24.4%,) p= 0.048, and number of patients with thirst at 4 hr. after operation in the DW group 4(8.9%) is significantly lower than the Ringer lactate group 11(24.4%), p=0.000. Like some, number of patients with thirst at discharge in the DW group 1(2.2%) is significantly lower than the RL group 7(15.6%), p=0.026 (Table 16).

In the Overall study period, the number of patients who were thirsty in the RL group 38(84.4) is significantly higher than the number of patients who were thirsty in the DW group 13(28.9%), p= 0.000. On the other hand, there were no significant differences between the two groups in the incidence of thirst at other time intervals (Table 16). The results indicate that administration of postoperative dextrose reduces postoperative thirst.

Table (16): Incidence of hunger in DW and RL groups postoperatively (0-5 hr). Data are presented as frequencies, percentages and analyzed by Chi Square test.

Question	Option	DW n(%)	RL n(%)	Chi-square	P-value
Hunger (30 mints after OP)	YES	0(0%)	1(2.2%)	1.011	0.315
	NO	45(100%)	44(97.8%)		
Hunger (1 hr. after OP)	YES	0(0%)	0(0%)	—	—
	NO	45(100%)	45(100%)		
Hunger (2 hr. after OP)	YES	1(2.2%)	0(0%)	1.011	0.315
	NO	44(97.8%)	45(100%)		
Hunger (3 hr. after OP)	YES	2(4.4%)	18(40%)	16.457	.000*
	NO	43(95.6%)	27(60%)		
Hunger (4 hr. after OP)	YES	9(20%)	23(51.1%)	9.504	.002*
	NO	36(80%)	22(48.9%)		
Hunger (5 hr. after OP)	YES	9(20%)	10(22.2%)	0.067	0.796
	NO	36(80%)	35(77.8%)		
Hunger (At Discharge)	YES	1(2.2%)	3(6.7%)	1.047	0.306
	NO	44(97.8%)	42(93.3%)		
Hunger (Overall period)	YES	19(42.2%)	39(86.7%)	19.397	0.000*
	NO	26(57.8%)	6(13.3%)		

* Significant at 0.05 level**.**

The number of patients with hunger at 3 hr. after operation in the DW group 2(4.4%) is significantly lower than the RL group 18(40%), p= 0.000, and the number of patients with hunger 4 hr. after operation in the DW group 9(20%) is significantly lower than the RL group 23(51.1%), p= 0.002. In the Overall period (0-5 hr), the number of patients who were hungry in the RL group 39(86.7%) is significantly higher than the number of patients who were hungry in the DW group 19(42.2%), p= 0.000.

On the other hand, there were no significant differences between the two groups in the incidence of hunger at other time intervals (Table 7). The results indicate that administration of postoperative dextrose reduces postoperative hunger.

Table (17): Incidence of bleeding in DW and RL groups postoperatively (0-5 hr.). Data are presented as frequencies, percentages and analyzed by Chi Square test

Question	Option	DW n(%)	RL n(%)	Chi-square	P-value
Bleeding(30 mints after OP)	YES	0(0%)	1(2.2%)	1.011	0.315
	NO	45(100%)	44(97.8%)		
Bleeding (1 hr. after OP)	YES	1(2.2%)	1(2.2%)	0.000	1.000
	NO	44(97.8%)	44(97.8%)		
Bleeding (2 hr. after OP)	YES	0(0%)	0(0%)	—	—
	NO	45(100%)	45(100%)		
Bleeding (3 hr. after OP)	YES	0(0%)	0(0%)	—	—
	NO	45(100%)	45(100%)		
Bleeding (4 hr. after OP)	YES	0(0%)	0(0%)	—	—
	NO	45(100%)	45(100%)		
Bleeding (5 hr. after OP)	YES	0(0%)	0(0%)	—	—
	NO	45(100%)	45(100%)		
Bleeding (At Discharge)	YES	0(0%)	0(0%)	—	—
	NO	45(100%)	45(100%)		
Bleeding (Overall period, 0-5 hr.)	YES	1(2.2%)	2(4.4%)	0.345	0.557
	NO	44(97.8%)	43(95.6%)		

The results in the table 18 show that there are no significant differences at (0.05) level between DW group and RL group in the percentages of patients who had bleeding in the overall period of the study.

5.8 Satisfaction statement about the patient's health condition and recommendation

Table (18): Satisfaction and recommendation of the patients about the management of PONV in DW and RL groups postoperatively (0-5 hr). Data are presented as frequencies, percentages and analyzed by Chi Square test

Question	Option	DW n(%)	RL n(%)	Chi-square	P-value
Do you satisfied about the management of PONV that given to you? At Discharge	VERY UNSATISFIED	0(0%)	0(0%)	11.696	0.008*
	UNSATISFIED	7(15.6%)	11(24.4%)		
	NEITHER	11(24.4%)	18(40%)		
	SATESIFIED	18(40%)	16(35.6%)		
	VERY SATISFIED	9(20%)	0(0%)		
Do you recommend this management to another patients? At Discharge	YES	31(68.9%)	17(37.8%)	8.750	0.003*
	NO	14(31.1%)	28(62.2%)		

* Significant at 0.05 level.

The number (%) of patients who were satisfied and very satisfied of management of PONV in DW group 27(60%) is greater than in the RL group 16(35.6%), p=0.008. The number (%) of patients who recommend the management of PONV in this study to another patients in DW group 31(68.9%) is greater than in the RL group 28(62.2%), p=0.003.

Chapter six

Discussion

Discussion

The present study investigates the effect of intravenous 5% dextrose on 90 children undergoing adeno / tonsillectomy on PONV and their needed for antiemetic rescue drugs and other postoperative symptoms such as pain, headache, drowsiness, fatigue, thirst, hunger and bleeding. The main result of this study was that participants who received I.V. dextrose after surgery had a significantly lower occurrence and intensity of nausea and less used of rescue antiemetic drugs in comparison to the RL group. Another outcome was that the participants in the dextrose group had significantly less postoperative symptoms such as headache, drowsiness, fatigue, hunger and thirst throughout the study period (0-5 hours). Contrarily, administration of I.V. 5% dextrose had no effect on the frequency of vomiting, occurrence and intensity of pain and postoperative bleeding.

The real influence of glucose on PONV is not clear. Management of emesis with oral glucose is acknowledged practice combined with nominal or no risk to non-diabetic patients (Hausel et al., 2005). Oral glucose has been utilized for the management of nausea with anonymous mechanism. Sugar has been contemplated since high osmotic pressure decreases muscle contractions in the gastrointestinal tract (Dabu-Bondoc et al., 2013).

Tissue hypo-perfusion can be an essential etiological factor for PONV. Gastric mucosal hypo-perfusion may occur due to hypovolemia after lengthened fasting. Contrarily, studies have shown that general

anesthesia, heightened intra-abdominal pressure due to pneumo-peritoneum during laparoscopy, and surgical stimulant without any decreasing in arterial pressure may source to mucosal hypo-perfusion. Trendelenburg's position during gynecological laparoscopy likewise aggravates regional hypo-perfusion. Intravenous utilization of fluid decreases hypervolemia and hypo-perfusion (Magner, McCaul, Carton, Gardiner, & Buggy, 2004).

Further, elevating blood glucose levels can elevate plasma cholecystokinin, which can attune anxiety and pain concluded its brain functions, decreasing pain and PONV (Hasegawa et al., 1996; Kissin et al., 2000). Postoperative pain is a recognizable peril factor for PONV(Gan& Analgesia, 2006). Gastric emptying can also be delayed by hyperglycemia, causing gastric fullness and nausea (McCaul et al., 2003).

The mechanism by which PONV is enhanced by IV dextrose may conceivably be analogous to the downturn of gastric acid excretion due to hyperglycemia. Gastric recession followed by nausea can be convinced by heightened gastric acid seepage (Agarwal et al., 2005).

It has been raised that blood glucose can have an increment effect on gastric acid secretion. Hyperglycemia can decrease gastric acid secretion by impeding the vagal cholinergic throughway(Loud, Holst, Rehfeld, Christiansen, & sciences, 1988).

Other studies have shown that the occurrence of PONV and other postoperative complications is due to insulin resistance; a consequence of perioperative trauma. Determining powerful solutions during the peri-

operative period can decrease the outcome of the overnight fast, preserve liver glycogen, decrease stress, and incline the insulin-sensitivity of tissues (Libiszewski, Drozda, Śmigielski, Kuzdak, & Kołomecki, 2012).

6.1Incidence and intensity of PONV

In the present study, 22 (48.9%) participants in the DW group experienced nausea in comparison to 35 (77.8%) participants in the RL group, p = 0.004. These results from our data were harmonious with Pin On, et al. (2016). Pin On, et al. . (2016) performed a study on 120 patients who underwent laparoscopic surgery under general anesthesia, randomly prorated into two groups, the first group (N = 75) obtained 1L 5% dextrose I.V. and the second group (N = 75) obtained 1L Ringer Lactate over 30-40 minutes after surgery in PACU, 17 (30%) participants in group D had nausea in comparison to 32 (54%) participants in group R, p = 0.001 at 0-6 hr. period

The results of the present study are likewise consistent with the study results performed by Jain et al., (2013) of 150, participants undergoing laparoscopic surgery were randomly designated to group 1 (N = 75) to obtain one liter of 5% dextrose or group 2 (N = 75) to obtain one liter of Ringer Lactate (RL) for a period of 30-40 min after operation in the PACU. The occurrence of nausea in group 1 and 2 (30.3% vs. 57.6%, p = 0.041) was shown at 0-6 hours. (12.5%vs. 18.6%, p = 0.364) at 6-24 hours and (42.8% vs. 72.8%, p <0.001) at 0-24h. In this study, the authors would reduce nausea at 0-6 hr. and 0-24 hr.

The present study likewise complies with the study results from Atashkhoei et al., (2018). In this study, 70 women were studied for diagnostic laparoscopy for infertility. After induction of anesthesia, study group (n = 35) obtained a solution 10 ml / kg / h with glucose 500 mg / kg (dextrose 5%) and the placebo group (n = 35) obtained Ringer's solution with normal saline 0.9% in equal volume intra-operatively. The study showed that intra-operative infusion of I.V. glucose decreased the total occurrence and intensity of PONV and antiemetic need over 24 postoperative hours. The intensity of PONV in PACU and 3 hours after operation was less in the experimental group in comparison to the placebo group. Our results were consistent with their results.

The current study is supported by Dabu-Bondoc, et al.(2013) study in which 62 non-diabetic participants were anticipated for gynecological laparoscopic and hysteroscopy surgeries. They concluded that the dextrose dispensation after anesthesia I.V. ensued in heightened PONV handling, which was recognized by reduces in the request for antiemetic rescues and the duration of the PACU time (Dabu-Bondoc et al., 2013).

Conversely, the current study results is not compatible with the study by(Patel et al., 2013) which was performed on non-diabetic patients programmed for gynecological, urological or breast surgery. Participants were randomly prorated for infusion of 250 ml lactate Ringer (group P; n = 75) or dextrose 5% in lactated Ringer (group D ; n = 87) over 2 hours beginning with surgical termination. Blood glucose was tested pre-

operatively, in the theatre room, instantly before administration of infusion fluid and in the PACU after administration of infusion fluid. Dextrose that was given during emergence was not associated with any difference in neither the time of onset or intensity of PONV. The need for more than one dose or more than one drug class of antiemetic therapy was not influenced by study fluid administration. Delayed occurrence of PONV and emesis frequencies were shown equally in groups D and P.

Our results are not likewise consistent with the study results of (McCaul et al., 2003)of 120, female patients. The occurrence of PONV was, 29% in dextrose and 22% in control group patients. Those patients had brief surgery time (mean, 23 minutes) and obtained a greater amount of dextrose. In the current study, patients also had briefer surgery (mean 28 minutes) and the occurrence and intensity could be reduced of PONV after surgery.

The present study demonstrated an absolute risk reduction of 29% in PONV in patients receiving postoperative dextrose compared to patients receiving postoperative ringer lactate. These results are consistent with the study performed by (Mishra et al., 2017) which showed that a 38% reduction in PONV in patients obtaining peri-operative dextrose compared to patients obtaining normal saline.

On the contrary, our results do not agree with the study results implemented by (Irkal et al., 2016). A total of 90 patients were scheduled for tympanoplasty under general anesthesia. Participants were randomized

to two groups (n = 45) to get either Ringer's lactate (group C) or 5% dextrose in Ringer's lactate (group D) I.V. after operation. Ondansetron 4 mg administered I.V. thirty minutes before recovery from anesthesia. The control group had 62.2% presence of PONV while the dextrose group had only 46.7% incidence. This variation in incidence of PONV was not significantly statistical (P = 0.1344).

Our results are not consistent with Pin On et al. (2016) who implemented a study in 86 patients, were randomized to obtain dextrose solution (n = 42) or normal saline (n = 44) as maintenance fluid at a 2 ml infusion rate / kg / hour. 14/ 44 patients (31.8%) in normal saline group in comparison to 15/42 patients (35.7%) in dextrose group evolved PONV (p = 0.09), the variation between both groups was not significant.

Complete response

Although in the current study, there is a difference in the number of patients with complete response in the dextrose group 23 (51.1%), which is significantly greater than the number of patients in Ringer lactate group 10 (22.2%), p= 0.004 at (0-5 hrs.). These results are appropriate with Pin On, Boonsri et al. (2016) study which showed that the number of patients in group D with complete response 39 (70%), which was significantly greater than the number of patients in group R 27 (46%), p = .0003 at 0-6 period. In contrast, our results do not agree with the study results of(Jain et al., 2016) which showed that complete response was comparable in both dextrose and ringer lactate groups.

Vomiting

In the current study, the number of patients with vomiting was lower in the DW group 6 (13.3%) in comparison to the RL group12 (26.7%), p = 0.114, but the difference was not statistically significant. These results are consistent with the study results of Jain et al., (2016) which showed that the occurrence of vomiting was 10.7% Vs 11.8%, 3.5% v.s. 5% and 14.2% Vs 16.9% at 0 -6h, 6- 24h and 0-24h in Group 1 and 2 respectively. It means that dextrose had no effect in diminishing the frequency of vomiting.

6.2 Need for rescue antiemetic medication when prophylaxis failed

In the current study, the number of patients requiring rescue medication of Ondansetron in the dextrose group 7 (15.6%) was significantly lower than the number of patients in the Ringer lactate group 17 (37.8%), P = 0.017. These results are practical with Irkal, Reddy et al. (2016) results which found that in the dextrose group, 15 (33%) patients were needed rescue antiemetic is significantly lower than the control group (55%), p = 0.0366.

The results of the current study agree likewise with the study performed by Mishra, Pandey et al. (2017), of 100 participants undergoing laparoscopic cholecystectomy who were prorated into two groups, dextrose and normal saline. It was revealed that dextrose reduced the need of rescue medication in comparison to normal saline, p= 0.002. On the contrary, our study is not in line with the study by Jain et al., (2013), in

their study who found that the need for rescue antimetics was comparable in dextrose and ringer lactate groups.

In the current study, there is a 22% decrease in the use of ondansetron in the dextrose water group. These results are consistent with the study results performed by (Mishra et al., 2017). Mersh et al., (2005) which showed that there is a 26% decrease in the use of ondansetron 4 mg in the dextrose group Mishra et al.,(2017) declared that dextrose might be contemplated in view of its simplicity, little risk and benefit to patient and satisfaction.

In accordance with our findings, (Firouzian et al., 2017) dictated that I.V. post-operative dextrose have a positive influence on reducing the need of antiemetic rescue drugs and decreasing the length of PACU time in healthy women go through gynecological surgery.

Our results are consistent with study with (Dabu-Bondoc et al., 2013) who studied 62, gynecological ambulatory participants. In her study, dextrose was given in Ringer's lactate solution I.V. after recovery in the PACU and was combined with decrease doses of rescue antiemetic in comparison to control group. In spite of prophylactic antiemetic that was given 30 minutes before recovery from general anesthesia to all of their patients, nausea developed in 46.7% of participants, almost equal to what we observed in the current study.

The results of the current study are not consistent with(On et al., 2016) who showed that patients in the dextrose group needed postoperative

antiemetic drugs significantly greater than those in normal saline (p = 0.04). The researchers declared that the dispensation of dextrose as a maintenance fluid did not decrease the occurrence of PONV during the first 24 hours after surgery. This inclined the consumption of postoperative antiemetic drugs.

Our results are also consistent with the study performed by(Irkal et al., 2016) which dictated that the positive influence of postoperative infusion of 5% dextrose on reducing rescue medication by 43.75% in non-diabetic patients following endoscopic middle ear surgery (tympanoplastic) procedures.

6.3 Postoperative Symptoms

Pain and Analgesia consumption

In the current study, the number of participants complaining of surgical site pain (0-5 hours) was 34 (75.6%) in the DW group versus 39 (86.7%) in the RL group, p = 0.178 was comparable at all-time points.

The number of patients needed rescue analgesia in DW group 3 (6.7%) versus 5(11.1%) in the RL group, p = 0.499 was also comparable at all-time points. The current results are not consistent with Jaine et al., (2013) which determined that the need for analgesics was greater in group (Ringer Lactate) compared to Group (Dextrose) 0-24 h. (p = 0.042).

In the current study, the mean of the total intra-operative opioids used in group DW was 28.78 µg ± 10.83 in the DW group v.s. 29.67 µg ±

11.65 in the RL group, p = 0.952 which is comparable at all-time points . These results are consistent with the study results performed by (Mishra et al., 2017) which showed that the mean total intr-aoperative opioids used in group NS versus group D were comparable at all-time scores.

In another study performed by(Atashkhoei et al., 2018),the participants were prorated to Ringer's solution, 10 ml / kg / h with (dextrose 5%) and the placebo group (n = 35)), Ringer solution with normal saline 0.9% , analgesicneed and their total dose were significantly different between the groups.

Tramadol was utilized more in the placebo group. The results showed that PONV was greater in the placebo group. The researchers submitted that there was an inter-relationship between PONV and pain(Hausel et al., 2005).

In the present study, the results showed that there were no significant differences between the number of participants in the DW group requiring rescue analgesia 3 (6.7%) (0-5 hours) compared to patients in RL group 5 (11.1%) , p = 0.499.

These results are suitable with(On et al., 2016) shown that at 0-6 hours there was no significant variation between the number of patients needed rescue analgesics 27 (48%) in the DW group in comparison to RL group 34 (58%), p = 0.313.

Headache, drowsiness, thirst, hunger and fatigue

In the present study, the incidence of headache at the total period (0-5 hours) in the DW group (0% (0)) is significantly lower in comparison to RL group 6 (13.3%), p = 0.011. During the total period (0-5 hours), the number of participants with drowsiness in the RL group 36 (80%) is significantly higher than the DW group 8 (17.8%), p = 0.000.

After 30 minutes postoperatively, the incidence of fatigue in the DW group 3 (6.7%) is significantly lower than in the RL group (22.2%), p = 0.036. and at one hour the incidence of fatigue in the DW group is 0 (0%) significantly lower than in the RL group 4 (8.9%), p = 0.041. Similarly, at 4 hours postoperatively, the incidence of fatigue in the DW group 0 (0%) is significantly lower than in the RL group 4 (8.9%), p = 0.041. Our results is similar to(On et al., 2016) results regarding fatigue concept showed that in group D, 39 (70%) participants were fatigue in comparison to 52 (88%) patients in group R at 0-6 period, P value <0.001.

Our results are also consistent with the study results performed by Jaine et al., (2013) which showed that the occurrence of fatigue and hunger was significantly higher in group (ringer lactate) in comparison to group (dextrose). But, on the other hand, do not agree on thirst in which it showed that the patients in the dextrose group felt more thirsty after surgery. In the ongoing study, the number of patients with thirsty in the RL group 38 (84.4) was significantly higher than the number of patients who were thirsty in the DW group 13 (28.9%), p = 0.000.

In the current study, the number of participants who were hungry in the RL group 39 (86.7%) over the entire period (0-5 hours) was significantly higher than the number of participants who were hungry in the DW group 19 (42.2%), p = 0.000. These results are harmonious with the study results of(On et al., 2016) which revealed that patients in group D 32 (57%) felt hungry in comparison to 48 (86%) patients in group R at 0-6 period P = 0.001.

Bleeding

In the case of bleeding, the results showed that there are no significant differences at 0.05 level between the group (DW) and the group (RL) in the percentage of patients who had bleeding during the total period of the study, since the P values were greater than (0.05) level in the study at all stages.

6.4 Satisfaction of patient

The number (%) of participants who were satisfied and very satisfied with the management of PONV in DW group 27 (60%) is greater than in the RL group 16 (35.6%), p = 0.008. The number of participants (%) of patients who recommend the management of PONV in this study to another patient in the DW group 31 (68.9%) is greater than in the RL group 28 (62.2%), p=0.008.

6.5 Conclusion

The administration of dextrose 5% I.V. postoperatively for patients undergoing adeno / tonsillectomy decreases the incidence and severity of nausea and had no significant influence on the vomiting. Moreover, administration of dextrose 5% I.V. post-operatively increases the complete response and it had an effect in reducing rescue medication requirements.

Although, administration of dextrose 5% I.V. postoperatively decreases postoperative symptoms such as headache, drowsiness, fatigue, hunger and thirst. Further studies are needed in order to affirm our results and resolve the optimal dose of dextrose needed and the type of dextrose that is better to decrease PONV.

6.6 Limitation of study

In this study, the effect of IV dextrose for the prophylaxis of PONV was evaluated in healthy patients who had went through tonsillectomy (which is a high-risk group). The study results cannot be generalized to other populations, including patients undergoing surgery of varying duration or different types of surgery. Patients could also have obtained different formulations of dextrose fluids.

Further, the two groups obtained IV fluids with the same guidelines, the doses per kg of body weight may be haphazardly dispersed between groups and hence the total volume of IV fluids may be an extraneous variable.

6.7 Recommendation

Usage of intravenous dextrose was recommended in order to prevent PONV, as it has a little side effect, readily access and economically cheap. Further studies are warranted to be broaden into different types of patients and initiate a benchmark for defining which dextrose may have outstanding antiemetic effect.

6.8 Certified Registered Nurse Anesthesia (CRNA) implications

Administration of IV dextrose immediately after surgery end can be used as an effective and safe method of prophylaxis of PONV after adeno/tonicillectomy surgery.

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Annex (1)

Collecting Data Sheet

1. اسم المريض	
2. رقم المريض في البحث	
3. رقم ملف المريض في المستشفى	
4. الجنس	
5. العمر	
6. مكان الاقامة	
7. الوزن (كلغرام)	
8. الطول (سم)	
9. BMI	
10. Hx of PONV	

Intraoperative

1. نوع العملية	
2. مده التخدير (دقيقة)	
3. مده الجراحة (دقيقة)	

Total intra operative drugs	
1. Total Fentanyl/ µg:	
2. Total Propofol/mg:	
3. Total Rocuronium:	
4. Total dexamethasone:	
5. Total perfalgan:	

1-On arrival to PACU and 30 min after operation :

No	Questions	30 in After Operation	
1	Do you have a headache ?	( ) Yes	( ) No
2	Are you drowsy/ dizzy ?	( ) Yes	( ) No
3	Are you thirsty ?	( ) Yes	( ) No
4	Are you tired ?	( ) Yes	( ) No
5	Are you hungry ?	( ) Yes	( ) No
6	If there's any bleeding?	( ) Yes	( ) No
7	Incidence of vomiting ?	( ) Yes	( ) No
8	Frequency of vomiting		
9	Incidence of nausea	( ) Yes	( ) No
10	Intensity of nausea using VAS-N:		
11	Are you retching ?	( ) Yes	( ) No
12	Frequency of retching		
13	Do you have pain on the area of surgery	( ) Yes	( ) No
14	Intensity of pain by using VAS-P:		
15	ondansetron 0.1 mg/kg	( ) Yes	( ) No
16	Analgesic (morphine 0.03 mg/kg)	( ) Yes	( ) No

Section 2: One hour interval

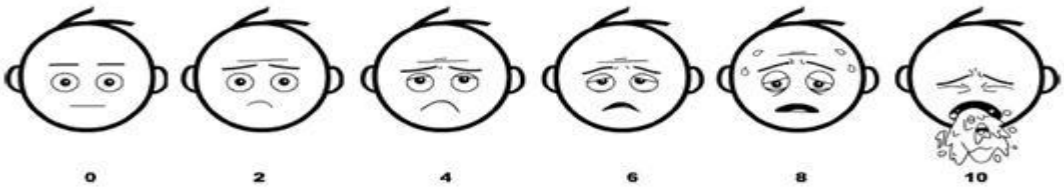
No	Questions	1 hr's aft OP		2 hr's aft OP		3 hr's aft OP	
1	Do you have a headache ?	( ) Yes	( ) NO	( ) Yes	( ) No	( ) Yes	( ) No
2	Are you drowsy/ dizzy ?	( ) Yes	( ) No	( ) Yes	( ) No	( ) Yes	( ) No
3	Are you thirsty ?	( ) Yes	( ) No	( ) Yes	( ) No	( ) Yes	( ) No
4	Are you tired ?	( ) Yes	( ) No	( ) Yes	( ) No	( ) Yes	( ) No
5	Are you hungry ?	( ) Yes	( ) No	( ) Yes	( ) No	( ) Yes	( ) No
6	If there's any bleeding?	( ) Yes	( ) No	( ) Yes	( ) No	( ) Yes	( ) No
7	Incidence of vomiting ?	( ) Yes	( ) No	( ) Yes	( ) No	( ) Yes	( ) No
8	Frequency of vomiting						
9	Incidence of nausea	( ) Yes	( ) No	( ) Yes	( ) No	( ) Yes	( ) No
10	Intensity of nausea using VAS-N:						
11	Are you retching ?	( ) Yes	( ) No	( ) Yes	( ) No	( ) Yes	( ) No
12	Frequency of retching						
13	Do you have pain on the area of surgery	( ) Yes	( ) No	( ) Yes	( ) No	( ) Yes	( ) No
14	Intensity of pain by using VAS-P:						
15	ondansetron 0.1 mg/kg	( ) Yes	( ) No	( ) Yes	( ) No	( ) Yes	( ) No
16	Analgesic (morphine 0.03 mg/kg)	( ) Yes	( ) No	( ) Yes	( ) No	( ) Yes	( ) No

No	Questions	4 hr's aft OP		5 hr's aft OP	
1	Do you have a headache?	( ) Yes	( ) NO	( ) Yes	( ) No
2	Are you drowsy/ dizzy?	( ) Yes	( ) No	( ) Yes	( ) No
3	Are you thirsty?	( ) Yes	( ) No	( ) Yes	( ) No
4	Are you tired?	( ) Yes	( ) No	( ) Yes	( ) No
5	Are you hungry?	( ) Yes	( ) No	( ) Yes	( ) No
6	If there's any bleeding?	( ) Yes	( ) No	( ) Yes	( ) No
7	Incidence of vomiting?	( ) Yes	( ) No	( ) Yes	( ) No
8	Frequency of vomiting				
9	Incidence of nausea	( ) Yes	( ) No	( ) Yes	( ) No
10	Intensity of nausea using VAS-N:				
11	Are you retching?	( ) Yes	( ) No	( ) Yes	( ) No
12	Frequency of retching				
13	Do you have pain on the area of surgery	( ) Yes	( ) No	( ) Yes	( ) No
14	Intensity of pain by using VAS-P:				
15	ondansetron 0.1 mg/kg	( ) Yes	( ) No	( ) Yes	( ) No
16	Analgesic (morphine 0.03 mg/kg)	( ) Yes	( ) No	( ) Yes	( ) No

Section 3: At discharge from hospital:

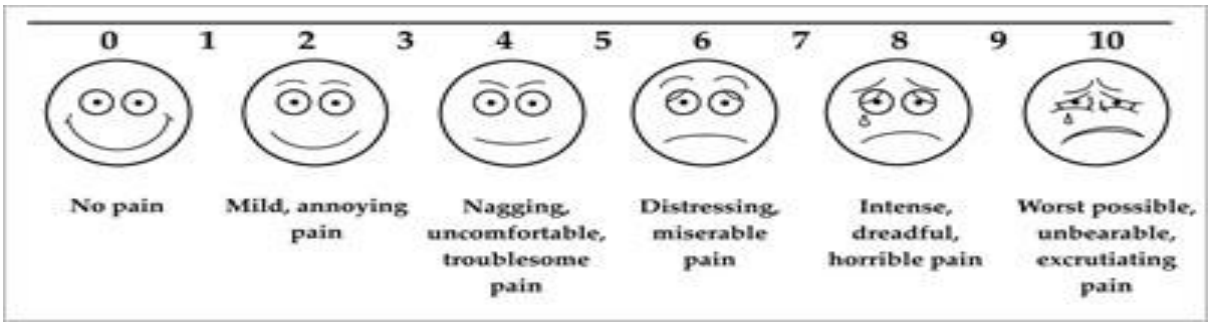
No	Questions	At Discharge From Hospital	
1	Do you have a headache ?	( ) Yes	( ) No
2	Are you drowsy/ dizzy ?	( ) Yes	( ) No
3	Are you thirsty ?	( ) Yes	( ) No
4	Are you tired ?	( ) Yes	( ) No
5	Are you hungry ?	( ) Yes	( ) No
6	If there's any bleeding?	( ) Yes	( ) No
7	Incidence of vomiting ?	( ) Yes	( ) No
8	Frequency of vomiting		
9	Incidence of nausea	( ) Yes	( ) No
10	Intensity of nausea using VAS-N:		
11	Are you retching ?	( ) Yes	( ) No
12	Frequency of retching		
13	Do you have pain on the area of surgery	( ) Yes	( ) No
14	Intensity of pain by using VAS-P:		
15	ondansetron 0.1 mg/kg	( ) Yes	( ) No
16	Analgesic (morphine 0.03 mg/kg)	( ) Yes	( ) No
17	Do you satisfied about treatment that given to you ?	1- ( ) Very unsatisfied	
		2- ( ) Un satisfied	
		3- ( ) Neither satisfied nor un satisfied	
		4- ( ) Satisfied	
		5- ( ) Very satisfied	
18	Do you recommend this treatment to another patient ?	( ) Yes	( ) No

Measure of nausea using VAS-N:



No nausea | Mild,annoying nausea | Nagging, uncomfortable, troublesome nausea | Distressing, miserable nausea | Intense, dreadful, horrible nausea | Worst possible, unbearable,(vomit) excruciating nausea

Measure of pain using VAS-P:



Annexes (2)
Consent form

موافقة للاشتراك في البحث العلمي للوصي على الطفل

اسم الباحث: احمد يوسف نصار .

عنوان البحث: دور المحلول الوريدي الدكستروز في تقليل حاله القيء والغثيان بعد عمليه استئصال اللوزتين/ ولحمية الانف.

مكان إجراء البحث: مستشفى النجاح الوطني الجامعي / نابلس.

أ- وصف البحث العلمي وهدفه وتفسير مجرياته:

يهدف هذا البحث إلى دراسة تجربه على مرضى عملية اللوزتين من خلال اعطاء المحلول الوريدي الدكستروز خلال العملية لمعرفة مدى أثره في لتقليل حاله القيء والغثيان بعد عمليه اللوزتين، ثم اجراء مقابله معهم بعد العمليه لقياس درجه القيء والغثيان بعد عمليه .

ب- الفوائد التي قد تنتج عن هذا البحث:

معرفه مدى أثر المحلول الوريدي الدكستروز في لتقليل حاله القيء والغثيان بعد عمليه اللوزتين يساعد على التقليل من استخدام الأدوية المستخدمه في تقليل القيء والغثيان وبالتالي التقليل من المضاعفات الجانبيه لهذه العقاقير و تقليل وقت المكوث في قسم الإنعاش بعد التخدير و زيادة الرضا لدى المريض وتقليل التكاليف الماديه عليه

سرية معلوماتك: في حال وافقت على المشاركة في هذه الدراسة، سيبقى إسمك طي الكتمان . لن يكون لأي شخص، ما لم ينص القانون على ذلك، حق الإطلاع على الاستمارة بعد تعبئتها

علما بان هذه المعلومات لن تستخدم الا لغرض البحث العملي فقط و بدرجة عالية من السرية و الخصوصية.

ج. حقك فى الانسحاب: من حقك الانسحاب من البحث في أي وقت دون إبداء أسباب دون أى عواقب سلبية عليك

موافقة الباحث:

لقد شرحت بالتفصيل للمشترك في البحث العلمي (.....) طبيعته ومجرياته وتأثيراته السلبية. ولقدأجبت على كل أسئلته بوضوح على خير ما أستطيع. وسوفأعلم المشترك بأي تغيرات في مجريات هذا البحث أو تأثيراته السلبية أو فوائده في حال حصولها أثناء البحث.

إسم الباحث المولى **توقيع الباحث المولى**

على موافقة المشترك للحصول على موافقة المشترك_____

التاريخ: _____

موافقة والدي الطفل المشترك:

نحن والدي الطفل .....لقد قمنا بقراءة استمارة القبول هذه وفهمنا مضمونها. تمت الإجابة على أسئلتنا جميعها. وبناء عليه فأننا، أحرار مختارين، نوافقإجراء هذا البحث و موافق على اشتراك طفلنا فيه، و إننانعلم أن الباحث سيكون مستعد للإجابة على تسائلاتنا، وإذا شعرنا لاحقا أن الأجوبة تحتاج إلى مزيد من الإيضاح فسوف نتصل بأحد أعضاء البحث كما نعرف تمام المعرفة بأننا احارر في جعل ابننى ينسحب من هذا البحث متى شئنا حتى بعد التوقيع على الموافقة دون أن يؤثر ذلك على العناية الطبية المقدمة له.

التاريخ _____

اسم الباحث : احمد يوسف محمود نصار

رقم هاتف: 0597260323

بريد الكتروني a.nassar@najah.edu

Annex 3

Articles Matrix

Title	Purpose and Research Design	Sample and Sampling	Data Collection	Analysis and results	Findings
Title of the study: Role of dextrose on reducing postoperative nausea and vomiting following endoscopic middle ear surgery: a randomized, double-blind, controlled study **Country and year :** India, 2016	**Purpose:** to measuring the effect of dextrose 5% on decreasing PONV in patients undergoing endoscopic middle ear surgery **Research Design:** A prospective, randomized, double-blind, placebo-controlled study	A 90 patients from both genders ages from 20-50 years scheduled for tympanoplasty under general anesthesia , divided into two groups (n=45) , (group C) receive Ringer's lactate solution and (group D) 5% dextrose in Ringer's lactate solution post operatively	PONV was assessed by verbal descriptive scale (VDS) at 0, 30, 60, 90, 120 min in the PACU and 24 hours postoperatively from score 0-3 score 0 = no PONV score 1 = mild PONV score 2 = moderate PONV score 3 = severe PONV Ondansetron 4 mg IV was given on patient with VDS score 3	The this study there no significant difference between group c (62.2% i.e. 28/45) and group d (46.7% i.e. 21/45) (P=0.1434) , but in significant different in antiemetic consumption post operatively group c (55.56% i.e25/45) versus group d (33.33% i.e 15/45) (P=0.0366) .	Using of intravenous infusion dextrose 5% postoperatively improve the post operative emesis as explained in results and by decrease the amounts of used antiemetic drugs , and decreasing the duration of post-anesthesia care unit stay

Title	Purpose and Research Design	Sample and Sampling	Data Collection	Analysis and results	Findings
Title of the study: Intravenous Dextrose Administration Reduces Postoperative Antiemetic Rescue Treatment Requirements and Postanesthesia Care Unit Length of Stay **Country and year :** USA, 2013	**Purpose:** to measuring the effect of dextrose 5% on decreasing post operative antiemetic consumption and PACU duration of stay **Research Design:** A prospective, randomized, double-blind, placebo-controlled study.	A 62 patients divided into two groups (n=31) of ASA I and II, aged between 18-70 of non-smoking outpatients undergoing gynecologic laparoscopic and hysteroscopic procedures under general anesthesia Study group (group C) receive Ringer's lactate solution and (group D) 5% dextrose in Ringer's lactate solution .	**Data Collection:** PONV was assessed in PACU by 11-point verbal rating scale (VRS) from 0-10, first-line rescue medications included IV dimenhydrinate 25 mg, ondansetron 4 mg, dimenhydrinate 25 mg, and promethazine 12.5 mg. pain assessed by 0-10 verbal numeric pain rating scale, no fentanyl given when pain score 0-3 pain score of 4-6=25 µg of fentanyl pain score 7-10=50 µg of fentanyl , if patients need >100 µg of fentanyl morphine IV 1 to 2 mg will be given until pain score decreased to 0-3.	(46.7% i.e 14/30) in the D5LR group experienced nausea compared with (62.5% i.e 20/32) in the LR group, (P = 0.31), and (13.3% i.e 4/30) in the D5LR group experienced vomiting compaired with (12.5% i.e 4/32) in the LR group (P = 1.00), also(40% i.e 20/30) in the D5LR group compared with (56.3% i.e 18/32) in the LR group needed rescue antiemetic (P = 0.22).	Using of intravenous infusion dextrose 5% postoperatively improve the post operative emesis by: 1-decrease in the use of rescue antiemetic consumption 2- decrease in the PACU duration of stay with minimum risk and high satisfaction.

Title	Purpose and Research Design	Sample and Sampling	Data Collection	Analysis and results	Findings
Title of the study: The relationship of intravenous dextrose administration during emergence from anesthesia to postoperative nausea and vomiting: a randomized controlled trial. **Country and year :** USA ,2013	**Purpose:** To measure the the relationship of IV dextrose administered during emergence from anesthesia to PONV, and duration of stay in PACU and level of satisfaction postoperatively. **Research Design:** A prospective, randomized, double-blind, placebo-controlled study.	18 -65 years of age adult female ASA physical status I and II non-diabetic out patients undergoing gynecologic, urologic, or breast surgery , the ptdivaided randomly into tow groups 1st group (group P; n = 75) recived 250 mL of lactated Ringer's solution and the 2nd group (group D; n = 87) recived 250 mL of dextrose 5% in lactated Ringer's solution over 2 hrs.	all patients didn't recivedantiemetics medication before arrival in the recovery room . PONV was assessed in PACU by 0-3 verbal descriptive scale, the score was recorded during PACU stay at 0, 30, 60, 90, and 120 minutes and 24 hrs since PACU discharge assessment for PONV by a blinded investigator by telephone or in person at the patient's bedside	52.9% patients in group d versus 46.7% in group complain of PONV occurred during the first 2 hours after anaesthesia*P* = 0.53 and 4 patients 4.6% in group d compares with 5 patients in group P 6.7% *P* = 0.73 had emesis episodes within 2 hours after anaesthesia. 9(10.3%) patients in group D and 13(17.3%) patients in group P had episode of PONV >2 hours after PACU arrival and overall for the 24 hrsnusea47(54%) patients in group D compaired with 38(50.7%) in group P experienced nausea.	the administration of dextrose during emergence from anesthesia wasn't correlated with a difference in the incidence of PONV exceeding 20% or in the severity of PONV in the first 2 hours after anesthesia. The relationship between PONV and the amount of the optimal dose and timing of IV dextrose administration still unclear and needs more farther investigations.

Title	Purpose and Research Design	Sample and Sampling	Data Collection	Analysis and results	Findings
Title of the study: Intravenous fluid loading with or without supplementary dextrose does not prevent nausea, vomiting and pain after laparoscopy **Country and year :** Canada, 2003	**Purpose:** To study the effect of iv compound sodium lactate (CSL) and without caloric supplementation with dextrose on nausea, vomiting and pain following general anesthesia for laparoscopy **Research Design:** A prospective, randomized, double-blind, placebo-controlled study.	a 120 ASA I female patients undergoing elective gynaecological laparoscopy under general anesthesia ,randomly divided into three groups group (a) received IV compound sodium lactate (CSL) 1-1.5 ML/KG per hour fasting duration , and group (b)) received IV compound sodium lactate 1-1.5 ML/KG per hour fasting duration with 0 .5-1G/KG dextrose added in 50% formulation (CSL/dextrose) and the control group (c) no IV fluid	Patients assessment was done by a blinded interviewer using a standardized questionnaire in PACU and two hours later in the ward and on the first postoperative morning. An adverse outcome was defined as the occurrence nausea, vomiting, antiemetic use, thirst, dizziness or sore throat.	78% of CSL group of patients had no PONV within 24 hr of anesthesia compared with 83% CSL/dextrose group P = 0.81 also 46.7% of the CSL/dextrose consioum fentanyl in the PACU more than the control group 8.9% P = 0.03, and there was significant increasing in the thirst symptom at 24Hrs in the CSL/dextrose group versus control group (P = 0.035).	* The administration of dextrose is associated with nausea and increase the opiods consumption and delayed thirst after gynecological laparoscopy. * Intravenous fluid didn’t decrease PONV.

Title	Purpose and Research Design	Sample and Sampling	Data Collection	Analysis and results	Findings
Title of the study: Effect of intravenous dextrose administration on postoperative nausea and vomiting in patients undergoing laparoscopic cholecystectomy: A randomised controlled trial **Country and year :** India, 2016	**Purpose:** Measure the effect of postoperative administration of IV dextrose on PONV in patients undergoing Laparoscopic Cholecystectomy. **Research Design:** A prospective, randomized, double-blind, placebo-controlled study	A 115 ASA I OR II patients undergoing laparoscopic surgery under general anaesthesia , divided randomly into two groups : the 1st group (N=56) received 1L of 5% dextrose intravenous the 2nd group (N=59) received 1L of Ringer Lactate over 30-40mints after the surgery in the PACU	All episodes of PONV (nausea, vomiting, retching) for 0-6 hours and 6-24 hours were recorded. Blood glucose was measured before and after completion of study fluid infusion. Requirement of rescue antiemetic therapy, postoperative pain, state of well being and length of stay in PACU were also evaluated as secondary objectives	30.3% patients of group 1 experienced nausea compared with 57.6% patients of group 2 p=0.041 at 0-6 Hrs period and 42.8% of patients of group 1 experienced nausea compared with 72.8% patients of group 2 p=0.001 at 0-24 hrs period also 10.7% of patients of group 1 experienced vominting compared with 11.8% patients of group 2 at 0-6hrs, and overall vomiting 14.2% of patients of group 1 experienc	the results on the group who received reported that the incidence of POVN was decreased in the 1st 24 hrs postoperative and the consumption of rescue medication is lesser and deceasing in the level of hunger and fatigue but the results reported more thirst postoperatively

				ed vomiting compared with 16.9% patients of group 2	

Title	Purpose and Research Design	Sample and Sampling	Data Collection	Findings
Title of the study: Is perioperative administration of 5% dextrose effective in reducing the incidence of PONV in laparoscopic cholecystectomy?:A randomized control trial **Country and year :** India, 2017.	**Purpose:** To measure the effect of preoperative intravenous dextrose 5% on PONV in patient scheduled for laparoscopic cholecystectomy under general anaesthesia **Research Design:** A prospective, randomized, double-blind, placebo-controlled study.	100 patients ASA I and II undergoing laparoscopic cholecystectomy under general anaesthesia the Patients were randomly divided into two groups and both of group received Ringer acetate IV as intraopartive maintenance fluid , the 1st group received 250 ML of .9% normal saline and the 2nd group received 5% dextrose at rate of 100ML/HR started at the time when gall bladder was taken out	14 (28%) of patients in group D had PONV compared with 33(66%) patients in the NS group within the 24 Hrs of surgery (p=.001),and consumption of antiemetic medication in the dextrose group 26% compared with NS group p value 0.002	the result of this trail was administration of dextrose 5% intravenous laparoscopic surgery can significantly improves the POVN management explained by decrease in the use of rescue antiemetic consumption

Title	Purpose and Research Design	Sample and Sampling	Data Collection	Analysis and results	Findings
Title of the study: Effect of intraoperative intravenous dextrose administration on postoperative nausea and vomiting in patients underwent the gynecologic laparoscopy a prospective randomized double-blinded controlled study **Country and year :** Thailand, 2016	**Purpose:** To test the effect of intraoperative intravenous dextrose 5% in patients scheduled for gynecologic laparoscopy undergoing general anaesthesia compared with normal saline solution **Research Design:** A prospective, randomized, double-blind, placebo-controlled study.	86 ASA grade I-II patients were randomly divided into two groups the 1st group (n= 42) receive dextrose solution and the 2nd group (n= 44) received normal saline solution as a maintenance at an infusion rate of 2 ml/kg/ hour	The Bellville PONV scores were recorded until complete 24 hours after surgery.Antiemetic medication administration and blood glucose levels were also recorded	(31.8% i.e 14/44) patients in normal saline solution group versus (35.7% i.e 15/42) dextrose solution group experienced PONV (p=0.09), and consuming of antiemetic medication postoperatively was significantly greater in the dextrose group compared with the normal saline group (p=0.04).	the result of this trail reported that dextrose solution administration as a maintenance did not reduce the incidence of PONV in the 1st 24 hours after anesthesia and increased the postoperative antiemetic medications consumption and blood glucose levels.

Annex 4

IRB approval

An-Najah
National University
Faculty of medicine
&Health Sciences
Department of Graduate
Studies

جامعة النجاح
الوطنية
كلية الطب وعلوم الصحة
دائرة الدراسات العليا

IRB Approval Letter

Study Title:

Role of intravenous dextrose on reducing PONV in children undergoing tonsillectomy and /or adenoidectomy: a randomized, double-blind, controlled study

Submitted by:

Ahmad Yousef Nassar, Dr. Aida Al-Qaisy, Dr. Wael Sadaqa

Date Reviewed:
5th October ,2017

Date Approved:
10th October, 2017

Your Study titled "***Role of intravenous dextrose on reducing PONV in children undergoing tonsillectomy and /or adenoidectomy: a randomized, double-blind, controlled study***".with achieved number (22) October 2017 was reviewed by An-Najah National University IRB committee and was approved on 10th October, 2017.

Hasan Fitian, MD

IRB Committee Chairman
An-Najah National University

جـامــعة الــنجاح الــوطــنية

كليـــة الدراســات العليـا

دور المحلول الوريدي الدكستروز في تقليل حاله القيء والغثيان بعد عمليه استئصال اللوزتين/ ولحمية الانف

إعداد

أحمد نصار

إشراف

د. عايدة القيسي

د. وائل صدقة

قدمت هذه الرسالة استكمالاً لمتطلبات الحصول على درجة الماجستير في تمريض التخدير، بكلية الدراسات العليا، في جامعة النجاح الوطنية، نابلس- فلسطين.

2019

دور المحلول الوريدي الدكستروز في تقليل حاله القيء والغثيان بعد عمليه استئصال اللوزتين/ ولحمية الانف

إعداد

أحمد نصار

إشراف

د. عايدة القيسي

د. وائل صدقة

الملخص

ترتبط عمليه استئصال اللوزتين بالعديد من المضاعفات مثال الغثيان والقيء والألم والنزيف بالتالي تقلل من الأنشطة اليومية التي يمارسها المريض، لذلك يجب السيطرة على أعراض ما بعد الجراحة.

لذلك كان الهدف من هذه الدراسة هو تقييم شده هذه الاعراض خاصة الغثيان والقيء ومعرفة مدى تأثيرالمحلول الوريدي الدكستروز في تقليل هذه الاعراض عند الاطفال ذوي القابلية لحصول القيء والغثيان معهم بعد عمليه استئصال اللوزتين.

المنهجية:

تم اختيار وتوزيع 90 حاله بطريقه عشوائية على مجموعتين، المجموعة الاولى تم إعطاءها المحلول الوريدي الدكستروز المجموعة الثانية تم إعطاؤها المحلول الوريدي الرينجر لاكتيت حيث كانت عملية التخدير متشابهة بين جميع الحالات ، وتم تقييم الاعراض السابقة ومدى رضا المرضى عن العلاج على فترات محدده حتى خروج المريض من المستشفى بعد العملية .

مكان إجراء التجربة:

تم إجراء التجربة في مستشفى النجاح الوطني الجامعي في نابلس في الضفة الغربية.

النتيجة:

اثبتت الدراسة ان المحلول الوريدي الدكستروز له أثر واضح على تقليل نسبة حدوث الغثيان بعد 30 دقيقه من النهاية العملية P-value 0.001 وبعد ساعه من العملية وايضا من فترة 1ساعه P-value 0.001 وبشكل عام لجميع الفترات p-value 0.004 وايضاه له تأثير على تقليل نسبه احتياج المرضى للعلاج البديل (medication rescue) p-value 0.017 ايضا ادى الى تخفيف نسبه المرضى الذي لم يحدث عندهم تقيئ وغثيان واستفراغ (الاستجابة التامة) (51.1%)23 بالمقارنة مع مجموعة الدواء الوهميp-value 0.04(22.2%)10.

ايضا اثنبتت الدراسة ان المحلول الوريدي الدكستروز له اثر في تقليل الاعراض الاخرى بعد عملية استئصال اللوزتين مثل (الصداع والاعياء والدوار والعطش والجوع) حيث انه ادى اعطاء المحلول الوريدي الدكستروز الى تقليل نسبة الصداع في فترة الساعة الثانية بعد العملية p-value 0.021 وبشكل عام لجميع الفترات0.011 p-value (overall period) وتقليل نسبة حدوث الاعياءفي مرحلة الثلاثون دقيقه p-value 0.036 وفترة الساعه0.041 p-value وفترة الاربع ساعات بعد العملية p-value 0.041.

ايضا ادى اعطاء المحلول الوريدي الدكستروز الى تقليل نسبة حدوث الدوار في مرحلة الثلاثون دقيقه p–value 0.006 وفترة الساعة p-value 0.00 وفترة الساعتين بعد العملية p–value 0.003 وبشكل عام لجميع الفترات0.00 p-value(overall period).

اما بالنسبه الى الى اعراض الجوع والعطش اثنبتت الدراسة ان المحلول الوريدي الدكستروز الى تقليل نسبة حدوث الجوع في مرحلة الثلاث ساعات p-value 0.00 وفترة الاربع ساعات p-value 0.002 وبشكل عام لجميع الفترات 0.00 p-value(overall period) و الى تقليل نسبة حدوث العطش في مرحلة الثلاث ساعات p-value 0.048 وبشكل عام لجميع الفترات0.00 p-value(overall period).

الاستنتاج:

استخدام المحلول الوريدي الدكستروز يخفف من نسبة حدوث الغثيان بعد العملية ويؤدي الى زياده نسبه الاستجابة الكاملة ويقلل احتياج المريض للعلاج البديل(medication rescue) بالمقارنة بالرينجر لاكتيت و تقليل الاعراض الاخرى بعد عملية استئصال اللوزتين مثل (الصداع والاعياء والدوار والعطش والجوع) و انه ليس له تاثير على تقليل نسبه حدوث القيء ونسبه الالم و النزيف بعد عملية استئصال اللوزتين.