TO COMPARE THE EFFICACY OF PALONOSETRON OVER ONDANSETRON IN PREVENTION OF POSTOPERATIVE NAUSEA AND VOMITING IN PATIENTS UNDERGOING LAPAROSCOPIC CHOLECYSTECTOMY UNDER GENERAL ANAESTHESIA

Thesis submitted to the Tamil Nadu Dr.M.G.R Medical University in partial fulfillment of the rules and regulations for MD Degree examination in Anaesthesiology to be held in April 2016

DEPARTMENT OF ANAESTHESIOLOGY

PSG INSTITUTE OF MEDICAL SCIENCES & RESEARCH

COIMBATORE – 641004

CERTIFICATE

This is to certify that Dr. GIRIDHARAN.S, post graduate student (2013 - 2016) in the Department of Anaesthesiology, PSG Institute of Medical Sciences & Research, Coimbatore has done this dissertation titled "TO COMPARE THE EFFICACY OF PALONOSETRON OVER ONDANSETRON IN PREVENTION OF POSTOPERATIVE NAUSEA AND VOMITING IN PATIENTS UNDERGOING LAPAROSCOPIC CHOLECYSTECTOMY UNDER GENERAL ANAESTHESIA" under the direct guidance and supervision of guide Prof. Dr. PRABHA UDAYAKUMAR in partial fulfillment of the regulations laid down by the Tamilnadu Dr. M.G.R. Medical University, Chennai, for MD., Anaesthesiology degree examination.

Prof. Dr. SHAIK MUSHAHIDA, MD

Professor & HOD

Department of Anaesthesiology

PSGIMS&R

Prof. Dr. RAMALINGAM MD

Dean

PSGIMS&R

CERTIFICATE

This is to certify that Dr. GIRIDHARAN.S, post graduate student (2013 - 2016) in the Department of Anaesthesiology, PSG Institute of Medical Sciences & Research, Coimbatore has done this dissertation titled "TO COMPARE THE EFFICACY OF PALONOSETRON OVER ONDANSETRON IN PREVENTION OF POSTOPERATIVE NAUSEA AND VOMITING IN PATIENTS UNDERGOING LAPAROSCOPIC CHOLECYSTECTOMY UNDER GENERAL ANAESTHESIA" under my direct guidance and supervision in partial fulfillment of the regulations laid down by the Tamilnadu Dr. M.G.R. Medical University, Chennai, for MD., Anaesthesiology degree examination.

Prof. Dr. PRABHA UDAYAKUMAR, MD

Professor

Department of Anaesthesiology

PSGIMS&R

DECLARATION

I hereby declare that this dissertation entitled "TO COMPARE THE EFFICACY OF PALONOSETRON OVER ONDANSETRON IN PREVENTION OF POSTOPERATIVE NAUSEA AND VOMITING IN PATIENTS UNDERGOING LAPAROSCOPIC CHOLECYSTECTOMY UNDER GENERAL ANAESTHESIA" was prepared by me under the direct guidance and supervision of my guide, Prof. Dr. PRABHA UDAYAKUMAR, PSG Hospitals, Coimbatore.

This dissertation is submitted to the Dr. M.G.R Medical University in partial fulfillment of the university regulations for the award of MD degree in Anaesthesiology, Examination to be held in April 2016.

Place: Coimbatore **Dr.GIRIDHARAN.S**

Date:

PSG Institute of Medical Sciences & Research
Institutional Human Ethics Committee

Recognized by The Strategic Initiative for Developing Capacity in Ethical Review (SIDCER)
POST BOX NO. 1674, PEELAMEDU, COIMBATORE 641 004, TAMIL NADU, INDIA
Phone : 91 422 - 2598822, 2570170, Fax : 91 422 - 2594400, Email : ihec@psgimsr.ac.in

June 16, 2014

To
Dr S Giridharan
Postgraduate
Department of Anaesthesiology
PSG IMS & R
Coimbatore

Ref.: Proposal titled: *"To compare the efficacy of Palonosetron over Ondansetron in prevention of postoperative nausea and vomiting in patients undergoing laparoscopic cholecystectomy under general anesthesia"*

Sub.: Ethics Committee Approval for the study

The Institutional Human Ethics Committee, PSG IMS & R, Coimbatore -4, has reviewed your proposal on 10th June, 2014 in its full board review meeting held at Research Conference Room, PSG IMS&R, between 9.30 am and 12.30 pm, and discussed your application to conduct the study entitled:

" To compare the efficacy of Palonosetron over Ondansetron in prevention of postoperative nausea and vomiting in patients undergoing laparoscopic cholecystectomy under general anesthesia"

The following documents were received for review:

1. Duly filled application form
2. Proposal
3. Informed Consent forms
4. Data Collection Tool
5. CV
6. Budget

The members who attended the meeting at which your study proposal was discussed are as follows:

Sl. No.	Name of the Member of IHEC	Qualification	Area of Expertise	Gender	Affiliation to the Institution Yes/No	Present at the meeting Yes/No
1	Dr. S. Bhuvaneshwari (Member-Secretary, IHEC)	MD	Clinical Pharmacology	Female	Yes	Yes
2	Mrs. Geetha S Kannan	+ 2	Lay person	Female	No	Yes
3	Mr Gowpathy Velappan	BA., BL	Legal Advisor	Male	No	Yes
4	Mrs G Malarvizhi	M Sc	Nursing	Female	Yes	No
5	Mr. R. Nandakumar (Vice-Chairperson, IHEC)	BA., BL	Legal Expert	Male	No	Yes
6	Dr. G. Rajendiran	DM	Clinician (Cardiology)	Male	Yes	Yes
7	Dr. V. Ramamurthy	Ph D	Biotechnology	Male	Yes	No

PSG Institute of Medical Sciences & Research
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8	Dr. M. Ramanathan	M Pharm, Ph D	Non-Medical (Pharmacy)	Male	Yes	Yes
9	Dr. P. Sathyan (Chairperson, IHEC)	DO, DNB	Clinician (Opthalmology)	Male	No	Yes
10	Dr. Seetha Panicker	MD	Clinician (Obstetrics & Gyanaecology)	Female	Yes	No
11	Dr. S. Shanthakumari	MD	Pathology, Ethicist	Female	Yes	Yes
12	Dr. Y.S. Sivan	Ph D	Social Scientist (Sociology)	Male	Yes	Yes
13	Dr. Sudha Ramalingam (Alternate Member-Secretary, IHEC)	MD	Public Health, Epidemiology, Genetics, Ethicist	Female	Yes	Yes
14	Mrs. K. Uma Maheswari	M Sc, M Phil. B Ed	Botany	Female	No	No
15	Dr. D. Vijaya	M Sc, Ph D	Basic Medical Sciences (Biochemistry)	Female	Yes	Yes

After due consideration, the committee has decided to approve the above proposal.

The approval is valid for one year.

We request you to intimate the date of initiation of the study to IHEC, PSG IMS&R and also, after completion of the project, please submit completion report to IHEC.

We hereby confirm that neither you nor any of your study team members have participated in the voting/ decision making procedure of the committee. The members of the committee who have participated in the voting/ decision making procedure of the committee do not have any conflict of interest in the referenced study.

This Ethics Committee is organized and operates according to Good Clinical Practice and Schedule Y requirements.

Non-adherence to the Standard Operating Procedures (SOP) of the Institutional Human Ethics Committee (IHEC) and national and international ethical guidelines shall result in withdrawal of approval (suspension or termination of the study). SOP will be revised from time to time and revisions are applicable prospectively to ongoing studies approved prior to such revisions.

PIs are required to send progress reports (in the form of an extended abstract with publications if any) to the IHEC every six months (and a month before expiry of approval date, if renewal of approval is being sought).

Request for renewal must be made at least a month ahead of the expiry of validity along with a copy of the progress report.

16.6.17

SECRETARY
PSG IMS&R
COIMBATORE-641004.
INSTITUTIONAL HUMAN ETHICS COMMITTEE

Dr S Bhuvaneshwari
Member - Secretary
Institutional Human Ethics Committee

TO COMPARE THE EFFICACY OF PALONOSETRON OVER ONDANSETRON IN PREVENTION OF POSTOPERATIVE NAUSEA AND VOMITING IN PATIENTS UNDERGOING LAPAROSCOPIC CHOLECYSTECTOMY UNDER GENERAL ANAESTHESIA

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Dr.GIRIDHARAN.S

DEPARTMENT OF ANAESTHESIOLOGY

PSG INSTITUTE OF MEDICAL SCIENCES & RESEARCH

COIMBATORE – 641004

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I thank all the faculties of Department of General Surgery and HPBLT for granting permission to carry out this study on their patients.

I also express my gratitude to the Principal and Dean of faculties and ethical committee of PSG IMS & R for granting me the permission to conduct the study.

I also thank my parents Dr.P.Sridharan & Dr.S.Suseela and my brother Dr.S.Harivasudevan for their constant support and encouragement.

I thank my friends and fellow postgraduates for their constant help and support throughout my study.

I am extremely grateful and obliged to all the patients without whom this study would have been complete.

ABBREVIATIONS

PONV	**Post Operative Nausea and Vomiting**
$5HT_3$	**5 – Hydroxytryptamine**
NK – 1	**Neurokinin – 1**
IV	**Intravenous**
CINV	**Chemotherapy Induced Nausea and Vomiting**
mg	**Milligram**
mcg	**Microgram**
Kg	**Kilogram**
CTZ	**Chemoreceptor Trigger Zone**
ENT	**Ear Nose and Throat**
FSH	**Follicular Stimulating Hormone**
BMI	**Body Mass Index**
GI	**Gastro Intestinal**
ASA (PS)	**American Society of Anesthesiologists (Physical Status)**
ECG	**Electro Cardio Gram**

ABBREVIATIONS

NIBP	**Non Invasive Blood Pressure**
Inj	**Injection**
NS	**Normal Saline**
NG	**Naso Gastric**
$ETCO_2$	**End Tidal Carbon dioxide**
mmHg	**Millimeter of Mercury**
hrs	**Hours**
SPSS	**Statistical Package for the Social Sciences**
NST	**Nucleus of the Solitary Tract**
NTS	**Nucleus of the Tractus Solitarius**

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a) CONSENT

b) RANDOM TABLE NO

c) PROFORMA

d) MASTER CHART

SNO	GROUP	NAME	AGE	SEX	HEIGHT	WEIGHT	BMI	ASA PS	SMOKER	ALOCH	HTN	DM	HOMS	DOSM	DOS	DOGAM	DOGA	GAS	IAP	TCO	NA2H	RE2H	VO2H	RM2H	NA6H	RE6H	VO6H	RM6H	NA24H	RE24H	VO24H	RM24H
1	1	RUMABANARJEE	31	FEMALE	152	57	24.67	1	NO	NO	NO	NO	NO	135	2	150	2	123	2	3	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
2	1	KALAIVANI	27	FEMALE	159	63	24.92	1	NO	NO	NO	NO	NO	165	2	180	2	155	2	3	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
3	1	JAYANTHI	32	FEMALE	149	68	30.63	1	NO	NO	NO	NO	NO	100	1	120	1	92	2	2	NO	NO	NO	NO	YES	YES	YES	YES	YES	NO	NO	NO
4	1	CHITRAVEL	37	MALE	169	78	27.31	1	NO	NO	NO	NO	NO	70	1	90	1	68	2	3	NO	NO	NO	NO	NO	NO	NO	NO	YES	NO	NO	NO
5	2	BALAGURU	53	MALE	172	69	23.32	2	NO	YES	NO	NO	NO	90	1	120	1	80	2	4	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
6	1	GOPAL	53	MALE	173	76	25.39	2	YES	NO	YES	NO	NO	60	1	80	1	50	2	3	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
7	1	GOMATHI	38	FEMALE	152	59	25.45	1	NO	NO	NO	NO	NO	210	3	240	3	200	2	2	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
8	1	DHANALAKSHMI	36	FEMALE	152	50	21.64	1	NO	NO	NO	NO	NO	130	2	150	2	121	2	4	NO	NO	NO	NO	NO	NO	NO	NO	YES	NO	NO	NO
9	2	BHUVANESHWARI	29	FEMALE	158	71	28.44	1	NO	NO	NO	NO	NO	120	2	140	2	103	2	2	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
10	1	SEEMA NAIR	48	FEMALE	161	61	23.55	2	NO	NO	YES	NO	NO	160	2	180	2	150	2	3	NO	NO	NO	NO	NO	NO	NO	NO	YES	YES	YES	YES
11	1	KRISHNAVENI	46	FEMALE	141	61	30.68	2	NO	NO	NO	YES	NO	125	2	150	2	115	2	3	NO	NO	NO	NO	NO	NO	NO	NO	YES	NO	YES	YES
12	2	SARASWATHI	47	FEMALE	152	57	24.67	2	NO	NO	YES	NO	NO	70	1	90	1	60	2	3	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
13	2	MUTHUKUMARI	51	FEMALE	141	62	31.19	2	NO	NO	NO	YES	NO	70	1	90	1	65	2	2	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
14	2	SHANTHI	48	FEMALE	159	62	24.52	1	NO	NO	NO	NO	NO	120	2	140	2	104	2	4	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
15	2	SHANTHI	51	FEMALE	152	61	26.40	1	NO	NO	NO	NO	NO	100	1	120	1	90	2	3	NO	NO	NO	NO	NO	NO	NO	NO	YES	NO	NO	NO
16	1	KUMAR	23	MALE	168	64	22.68	2	YES	NO	NO	NO	NO	155	2	180	2	145	2	2	NO	NO	NO	NO	NO	NO	NO	NO	YES	NO	YES	YES
17	2	RAJAKUMARI	39	FEMALE	159	61	24.13	1	NO	NO	NO	NO	NO	95	1	120	1	85	2	3	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
18	1	THANGAMANI	26	FEMALE	164	57	21.19	1	NO	NO	NO	NO	NO	130	2	150	2	120	2	2	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
19	1	ANNANDHAN	29	MALE	172	67	22.65	2	YES	YES	NO	NO	NO	70	1	90	1	60	2	4	NO	NO	NO	NO	YES	YES	YES	YES	NO	NO	NO	NO
20	2	IYYAMMAL	32	FEMALE	167	84	30.12	1	NO	NO	NO	NO	NO	140	2	160	2	130	2	3	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
21	2	SAKTHIVEL	60	MALE	173	68	22.72	2	NO	NO	YES	NO	NO	70	1	90	1	63	2	3	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
22	2	ANTHONY RAJ	48	MALE	172	79	26.70	2	NO	NO	YES	NO	NO	160	2	180	2	150	2	2	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
23	2	MALLIGA	55	FEMALE	169	68	23.81	1	NO	NO	NO	NO	NO	70	1	90	1	60	2	2	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
24	2	SUGANTHI	35	FEMALE	148	54	24.65	1	NO	NO	NO	NO	NO	130	2	150	2	120	2	4	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
25	1	KALPANA	34	FEMALE	159	61	24.13	1	NO	NO	NO	NO	NO	160	2	180	2	150	2	3	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
26	1	KOWASALYA	39	FEMALE	161	56	21.60	1	NO	NO	NO	NO	NO	100	1	120	1	90	2	3	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
27	2	JAYANTHI	47	FEMALE	166	68	24.68	2	NO	NO	YES	NO	NO	190	3	210	3	180	2	3	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
28	1	POONGOTHAI	30	FEMALE	163	60	22.58	1	NO	NO	NO	NO	NO	110	2	130	2	92	2	2	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
29	1	USHA NATHARAJAN	55	FEMALE	161	60	23.15	2	NO	NO	YES	NO	NO	100	1	120	1	95	2	4	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
30	2	LAVANYA	40	FEMALE	150	69	30.67	1	NO	NO	NO	NO	NO	270	3	300	3	260	2	3	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
31	1	SMITHA AJITH	36	FEMALE	146	66	30.96	1	NO	NO	NO	NO	NO	100	1	120	1	90	2	3	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
32	1	JAYABAL	51	MALE	167	71	25.46	2	NO	NO	YES	YES	NO	140	2	160	2	130	2	3	NO	NO	NO	NO	NO	NO	NO	NO	YES	NO	YES	YES
33	1	MOHAN	38	MALE	172	88	29.75	2	NO	NO	YES	YES	NO	100	1	120	1	90	2	2	NO	NO	NO	NO	NO	NO	NO	NO	YES	NO	YES	YES
34	2	SANTHANALAKSHMI	57	FEMALE	151	61	26.75	2	NO	NO	YES	NO	NO	85	1	105	1	75	2	4	NO	NO	NO	NO	NO	NO	YES	YES	YES	NO	YES	YES
35	2	MUBARAK	39	FEMALE	159	54	21.36	1	NO	NO	NO	NO	NO	165	2	180	2	155	2	3	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
36	1	RAJATHI	40	FEMALE	163	64	24.09	1	NO	NO	NO	NO	NO	60	1	80	1	50	2	3	NO	NO	NO	NO	NO	NO	NO	NO	YES	NO	NO	NO
37	2	POONGOTHAI	38	FEMALE	141	60	30.18	1	NO	NO	NO	NO	NO	160	2	180	2	150	2	2	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
38	1	SAVITHIRI	38	FEMALE	148	56	25.57	1	NO	NO	NO	NO	NO	85	1	105	1	75	2	4	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
39	1	VALLIAMMAL	50	FEMALE	163	58	21.83	1	NO	NO	NO	NO	NO	190	3	210	3	173	2	3	NO	NO	NO	NO	NO	NO	NO	NO	YES	NO	YES	YES
40	2	ESAISELVI	47	FEMALE	151	64	28.07	1	NO	NO	NO	NO	NO	72	1	92	1	62	2	2	NO	NO	NO	NO	NO	NO	NO	NO	YES	NO	NO	NO
41	1	SELVI	42	FEMALE	161	62	23.92	1	NO	NO	NO	NO	NO	160	2	180	2	150	2	3	NO	NO	NO	NO	NO	NO	NO	NO	YES	NO	NO	NO
42	1	KALAISELVI	57	FEMALE	156	64	26.30	1	NO	NO	NO	NO	NO	110	1	120	1	100	2	4	NO	NO	NO	NO	NO	NO	NO	NO	YES	YES	YES	YES
43	2	NACCHAMAL	57	FEMALE	163	74	27.58	2	NO	NO	NO	YES	NO	70	1	90	1	67	2	3	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
44	2	RANI	32	FEMALE	161	64	24.69	1	NO	NO	NO	NO	NO	158	2	180	2	148	2	3	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
45	2	PANKAJAM	43	FEMALE	148	58	26.48	1	NO	NO	NO	NO	NO	70	1	90	1	60	2	2	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
46	1	PONNI	41	FEMALE	141	57	28.67	1	NO	NO	NO	NO	NO	160	2	180	2	150	2	4	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
47	1	KALAIMANI	32	FEMALE	152	55	23.81	1	NO	NO	NO	NO	NO	100	1	120	1	90	2	3	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
48	2	RAJENDRAN	50	MALE	169	68	23.81	2	YES	NO	YES	NO	NO	230	3	240	3	220	2	4	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
49	1	ANNAMALI	56	MALE	167	63	22.59	1	NO	NO	NO	NO	NO	220	3	240	3	210	2	3	YES	YES	YES	YES	YES	NO	NO	NO	NO	NO	NO	NO
50	2	SANGEETHA	29	FEMALE	163	64	24.09	1	NO	NO	NO	NO	NO	110	1	120	1	100	2	4	NO	NO	NO	NO	NO	NO	NO	NO	YES	NO	YES	YES

51	2	PANNEER	53	MALE	167	80	28.69	2	NO	NO	YES	NO	NO	160	2	180	2	150	2	3	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
52	2	SANTHAMANI	55	FEMALE	163	59	22.21	2	NO	NO	NO	YES	NO	150	2	180	2	140	2	4	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
53	2	GEETHA	31	FEMALE	141	46	23.14	1	NO	NO	NO	NO	NO	100	1	120	1	90	2	4	NO	NO	NO	NO	YES	NO	NO	NO	NO	NO	NO	NO	NO
54	2	BASKAL MERRY	32	FEMALE	152	62	26.84	1	NO	NO	NO	NO	NO	180	3	210	3	174	2	3	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
55	2	BEULAH	55	FEMALE	156	64	26.30	1	NO	NO	NO	NO	NO	190	3	210	3	180	2	4	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
56	1	DEIVAM	46	FEMALE	148	58	26.48	2	NO	NO	YES	NO	NO	100	1	120	1	87	2	3	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
57	2	VIJAYA	55	FEMALE	159	57	22.55	2	NO	NO	YES	NO	NO	85	1	105	1	75	2	4	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
58	1	NAGENDRI	43	FEMALE	141	61	30.68	1	NO	NO	NO	NO	NO	85	1	105	1	75	2	2	NO	NO	NO	NO	NO	NO	NO	NO	YES	NO	YES	YES	
59	2	SUGUMARAN	57	MALE	169	89	31.16	2	NO	NO	YES	NO	NO	100	1	120	1	86	2	3	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
60	2	JAYAKUMAR	35	MALE	168	63	22.32	1	NO	NO	NO	NO	NO	95	1	120	1	85	2	4	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
61	2	KALEESHWARI	33	FEMALE	159	70	27.69	1	NO	NO	NO	NO	NO	70	1	90	1	64	2	2	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
62	2	ARUNKUMAR	24	MALE	173	66	22.05	2	YES	NO	NO	NO	NO	80	1	100	1	70	2	4	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
63	1	SARANYA	29	FEMALE	148	60	27.39	1	NO	NO	NO	NO	NO	100	1	120	1	90	2	3	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
64	2	ARUMUGAM	41	MALE	169	70	25.51	2	YES	YES	NO	NO	NO	100	1	120	1	90	2	4	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
65	2	FAIROJA	42	FEMALE	152	60	25.97	1	NO	NO	NO	NO	NO	95	1	120	1	85	2	2	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
66	2	ESWARI	26	FEMALE	163.5	54	20.20	1	NO	NO	NO	NO	NO	135	2	150	2	125	2	3	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
67	2	VELUSAMY	31	MALE	167	70	25.10	1	NO	NO	NO	NO	NO	100	1	120	1	89	2	4	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
68	1	UMAMAGESHWARI	27	FEMALE	161	68	26.23	1	NO	NO	NO	NO	NO	190	3	210	3	180	2	2	YES	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
69	1	AMUDHA	31	FEMALE	158	80	31.03	1	NO	NO	NO	NO	NO	90	1	110	1	80	2	4	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
70	1	NIRMALA	27	FEMALE	151	58	25.44	1	NO	NO	NO	NO	NO	100	1	120	1	90	2	3	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
71	2	BALAMURUGAN	48	MALE	173	64	21.38	2	NO	YES	NO	YES	NO	70	1	90	1	60	2	4	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
72	2	THILLAIKARASI	33	FEMALE	161	60	23.15	1	NO	NO	NO	NO	NO	95	1	120	1	87	2	2	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
73	1	RAVISHANKAR	52	MALE	169	67	23.46	1	NO	NO	NO	NO	NO	110	1	120	1	94	2	4	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
74	1	VIJAYA	27	FEMALE	166	64	23.23	1	NO	NO	NO	NO	NO	100	1	120	1	90	2	3	NO	NO	NO	NO	NO	NO	NO	NO	NO	YES	YES	YES	YES
75	1	SHANTHI	43	FEMALE	161	57	21.99	2	NO	NO	YES	NO	NO	220	3	240	3	210	2	4	YES	YES	YES	YES	NO	NO	NO	NO	NO	NO	NO	NO	NO
76	2	YASMIN	32	FEMALE	161	58	22.38	1	NO	NO	NO	NO	NO	265	3	300	3	255	2	2	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
77	1	PADMAVATHI	52	FEMALE	151	58	25.44	2	NO	NO	YES	NO	NO	175	3	195	3	165	2	2	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
78	1	SARADHAMANI	36	FEMALE	159	73	28.88	1	NO	NO	NO	NO	NO	160	2	180	2	150	2	3	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
79	2	SELVARAJ	54	MALE	169	69	24.16	2	NO	NO	NO	YES	NO	100	1	120	1	85	2	2	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
80	1	JOTHIMANI	37	FEMALE	163	65	24.46	1	NO	NO	NO	NO	NO	150	2	170	2	140	2	4	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
81	2	GOMATHI	30	FEMALE	159	63	24.92	1	NO	NO	NO	NO	NO	130	2	150	2	120	2	4	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
82	2	PUSHPARANI	44	FEMALE	152	60	25.97	2	NO	NO	YES	NO	NO	135	2	150	2	125	2	4	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
83	2	SELVAKUMAR	34	MALE	169	76	26.61	2	YES	YES	NO	NO	NO	270	3	300	3	260	2	3	NO	NO	NO	NO	NO	NO	NO	NO	YES	NO	NO	NO	NO
84	1	SELVAKUMAR	41	MALE	168	65	23.03	2	YES	YES	NO	NO	NO	200	3	220	3	190	2	2	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
85	1	MANIKANDHAN	40	MALE	167	70	25.10	1	NO	NO	NO	NO	NO	185	3	210	3	175	2	4	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
86	1	UBAIDILLAH	55	MALE	169	66	23.11	2	NO	YES	YES	NO	NO	125	2	150	2	115	2	4	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
87	2	MUMTAJ BEGAM	35	FEMALE	163	59	22.21	1	NO	NO	NO	NO	NO	65	1	85	1	55	2	3	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
88	1	LOVELY ANTHONY PRIYA	31	FEMALE	161	53	20.45	1	NO	NO	NO	NO	NO	205	3	225	3	195	2	2	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
89	2	AKKAMMA	58	FEMALE	161	57	21.99	1	NO	NO	YES	NO	NO	90	1	120	1	80	2	4	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
90	1	RUCKMANI	59	FEMALE	168	62	21.97	2	NO	NO	YES	NO	NO	130	2	150	2	120	2	4	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
91	2	CHIRAVEL	43	FEMALE	152	64	27.70	2	NO	NO	NO	YES	NO	125	2	150	2	115	2	3	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
92	2	KALAIVANI	25	FEMALE	170	69	23.88	1	NO	NO	NO	NO	NO	100	1	120	1	90	2	4	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
93	1	GANESHAN	48	MALE	167	68	24.38	2	NO	NO	YES	NO	NO	190	3	210	3	180	2	4	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
94	1	DHAYANITHI	23	FEMALE	161	61	23.53	1	NO	NO	NO	NO	NO	130	2	150	2	120	2	2	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
95	1	RAVICHANDRAN	54	MALE	168	87	30.82	2	YES	NO	YES	NO	NO	130	2	150	2	120	2	4	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
96	2	SATHYA	26	FEMALE	163	57	21.45	1	NO	NO	NO	NO	NO	95	1	120	1	85	2	3	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
97	1	SATHYABAMA	58	FEMALE	163	60	22.58	2	NO	NO	NO	YES	NO	80	1	100	1	70	2	4	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
98	2	JAYARANI	33	FEMALE	163	66	24.84	1	NO	NO	NO	NO	NO	130	2	150	2	120	2	4	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
99	1	MURUGASEAN	58	MALE	168	62	21.97	2	NO	NO	NO	YES	NO	100	1	120	1	83	2	2	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
100	1	LAKSHMIAMMAL	57	FEMALE	159	56	22.15	2	NO	NO	NO	NO	NO	100	1	120	1	93	2	4	NO	NO	NO	NO	YES	YES	YES	YES	NO	NO	NO	NO	

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ABSTRACT

INTRODUCTION

The post operative nausea and vomiting is one of the common complications following anaesthesia. The incidence of post operative nausea and vomiting is more following general anaesthesia than regional anaesthesia. The patients undergoing laparoscopic surgeries are more prone for developing post operative nausea and vomiting. Hence we evaluated the efficacy of the effectiveness of intravenous Palonosetron 75mcg with intravenous Ondansetron 4mg as single pre induction dose in laparoscopic cholecystectomy in preventing PONV following general anaesthesia.

METHODOLOGY

After obtaining Institutional Human Ethics Committee clearance the study was carried out in PSGIMS&R during July 2014 – May 2015. A total of 100 patients who were posted for laparoscopic cholecystectomy belonging to ASA Class I & II were included in the study. These patients were randomized into 2 groups of 50 each by computer generated randomized numbers. The patients belonging to Group – A received Inj. Ondansetron 4mg just before induction of anaesthesia and patients belonging to Group – B received Inj. Palonosetron 75mcg just before induction of anaesthesia. All patients were followed for 24 hours post operatively. The incidences of nausea, retching and vomiting were observed postoperatively during 2 hrs, 6 hrs and 24 hrs post procedure interval period.

RESULTS

In our study, the incidence of nausea, retching, vomiting at 24 hrs post procedure in Ondansetron group are 38%, 16% and 28% respectively. The incidence of nausea and vomiting at 24 hrs post procedure in Palonosetron group are 12% and 4%. The incidence of nausea and vomiting are more at period between 6hrs and 24 hrs post procedure.

The incidence of nausea was 38 percent in Ondansetron group and 12 percent in Palonosetron group [p value 0.003]. The incidence of vomiting was 28 percent in Ondansetron group and 4 percent in Palonosetron group [p value 0.001].

Need for rescue medication was also high in Ondansetron group when compared to Palonosetron group [p value 0.001]. The complete responders in Ondansetron group are 62% and in Palonosetron group are 88% [p value 0.003]. There were no adverse events reported throughout the study in both the groups.

CONCLUSION

Based on our study, it is observed that Palonosetron a second generation $5HT_3$ receptor antagonist has prolonged duration of action and has decreased the incidence of post operative nausea and vomiting significantly when compared to Ondansetron, providing patients with lesser episodes of PONV in patients undergoing laparoscopic cholecystectomy under general anesthesia.

KEYWORDS

Post operative nausea and vomiting, Ondansetron, Palonosetron, Laparoscopic cholecystectomy

1. INTRODUCTION

The clinical term Post Operative Nausea and Vomiting [PONV] got popularized after the landmark review from Watcha and White in 1992 and became a medical subject heading in the National Library of Medicine in the year 1999. Patient's outcome has significantly improved after prevention of PONV[1].

The most common post operative complications following surgery are pain and post operative nausea and vomiting which is a challenging task for both surgeon and anaesthesiologist due to adverse effects caused by it and delay in discharging the patient. The incidence of post operative nausea and vomiting was about 80% in earlier days[2]. In the modern era of anaesthesia practice the incidence of post operative nausea and vomiting declined to about 50%, but the prevalence still remains high[2, 3].

The incidence of post operative nausea and vomiting is more following general anaesthesia than regional anaesthesia. The incidence of PONV following general anaesthesia is about 20–30 %[3, 4] and 80% in patients who has increased risk factors for PONV[4, 5].

Though there are multiple advances over several years in minimizing the adverse outcomes after anaesthesia, patients continue to rank nausea and vomiting as their most undesirable outcome along with post operative pain. As an anaesthetist we play vital role in controlling post operative nausea and vomiting.

Apfel CC stated that post operative nausea and vomiting causes increase in the rate of discomfort, wound dehiscence, dehydration and electrolyte imbalance[1]. PONV may also pose to pulmonary aspiration[1] which prolongs the duration of stay in hospital and can increase the rate of hospital acquired infection. Post operative nausea and vomiting is one of the limiting factors for discharge of patient who undergo day care procedures[5].

Post operative nausea and vomiting has multi factorial etiology. The factors which predict the incidence of post operative nausea and vomiting are patient's age, gender, smoking habits, duration and type of surgery, pain, opioid requirements and anaesthetic inhalation agents [5,6].

There are various scoring systems available to identify the patients who are at risk of developing post operative nausea and vomiting. Apfel[4] scoring system is one such to predict the incidence of post operative nausea and vomiting. This scoring system includes factor like female gender, smoking status, previous history of motion sickness or post operative nausea and vomiting and use of opioids for pain relief during post operative period. Based on the above scoring system the incidence varies with presence of risk factors. When there is no risk factor the incidence was 10% and with addition of each factor the incidence varies between 20 – 80 %.

The patients undergoing laparoscopic surgeries are more prone for developing post operative nausea and vomiting as there is more stretching of mechano receptors and increased release of Serotonin. All these are due to creation

of pneumoperitoneum which is part of all laparoscopic procedures[6]. The incidence of post operative nausea and vomiting ranges from 50–70% among patients undergoing laparoscopic cholecystectomy[6, 7].

Several neurotransmitters are involved in PONV which include Serotonin, Dopamine, Acetylcholine, Histamine, Opioids and Neurokinin-1[8-10]. Along with several neurotransmitters the stimulation of Vestibulo-cochlear, Vagus or Glossopharyngeal nerves also may cause PONV[8–10]. Involvement of several mechanisms for nausea and vomiting makes it complex to understand the patho - physiology of PONV.

Post operative nausea and vomiting can be prevented by both pharmacological and non pharmacological method[11]. The pharmacological methods to prevent post operative nausea vomiting include various groups of drugs like 5-Hydroxytryptamine (5-HT_3) receptor antagonists, Neurokinin -1 (NK-1) receptor antagonists, Corticosteroid, Butyrophenones, Antihistamines and Anticholinergics[11].

The most commonly used pharmacological method of preventing post operative nausea and vomiting is $5HT_3$ receptor antagonists and include drugs like Ondansetron, Granisetron, Dolasetron, Tropisetron, Ramosetron, and Palonosetron. Among these $5HT_3$ receptor antagonists, Ondansetron is most commonly used drug for prevention of nausea and vomiting. Recently the second generation $5HT_3$ receptor antagonist, Palonosetron is approved in India for treatment of PONV.

Intravenous Ondansetron 4mg showed better prevention of post operative nausea and vomiting[12, 13] in the last decades. Presently, Palonosetron also has shown to have better control of post operative nausea and vomiting when given as a single pre induction dose of 75mcg[14, 15].

Palonosetron with its half life of 40 hours is approved for management of post operative nausea and vomiting since 1999 in India[11, 14, 15].

The efficacy of Palonosetron is shown to be superior to Ondansetron in treatment of Chemotherapy Induced Nausea and Vomiting [CINV]. However studies comparing the effectiveness of these drugs in preventing PONV are sparse.

In our study, we evaluated the effectiveness of intravenous Palonosetron with intravenous Ondansetron as single pre induction dose in laparoscopic cholecystectomy in preventing PONV.

AIM OF THE STUDY

2. AIM OF THE STUDY

To compare the efficacy of Palonosetron over Ondansetron in prevention of postoperative nausea and vomiting in patients undergoing laparoscopic cholecystectomy under general anaesthesia.

REVIEW OF LITERATURE

3. REVIEW OF LITERATURE

Tramer et al[13] in 1997 have compared the different dose of Ondansetron 1mg, 4mg, 8 mg with placebo drug in 2,812 patients and the combined results showed that Ondansetron (4 mg) was the optimal dose for preventing PONV.

Candiotti K et al[14] in their randomized double blind study in 574 patients concluded that 75mcg of Palonosetron effectively reduce the PONV when compared to 25mcg and 50mcg. The complete responders were high in Palonosetron group who received 75mcg when compared to placebo. This study had statistically significance in decrease in incidence of PONV.

Kovac A et al[15] evaluated the effectiveness of the drug and therapeutic dose of Palonosetron in the management of post operative nausea and vomiting in major gynaecological and laparoscopic surgery. This multicentre study compared 25mcg, 50mcg and 75mcg doses of Palonosetron and concluded 75 mcg is more effective for prevention of post operative nausea and vomiting.

Hahm T et al[16] in their prospective, randomized, multicenter study in 2014 evaluated the therapeutic efficacy and safety of Palonosetron in PONV treatment over 72 hour period. From this study, it was concluded that 75 mcg of Palonosetron was effective in management of PONV at 24 and 72 hrs.

Laha B et al[17] compared the antiemetic effect of intravenous Palonosetron with intravenous Ondansetron in laparoscopic cholecystectomy in 98 patients in 2013 and concluded that there was no statistically significant difference in incidence of PONV in both Palonosetron and Ondansetron group. This study had

28.6% complete responders in Ondansetron group and 32.7% in Palonosetron group and there was no statistically significant outcome in primary measures.

Abd El-Hamid et al[18] showed that Palonosetron was said to be good antiemetic when compared to Ondansetron in patients undergoing middle ear surgeries in 2014. This study was carried out in 60 patients of age group ranging between 23 years to 48 years. These patients were divided into two groups and received either Ondansetron 4mg or Palonosetron 25mcg as per randomization. In this study, the complete responders were 73.3 % and 93.3% in Ondansetron and Palonosetron group respectively. They have concluded that Palonosetron is a good alternative drug for prevention of PONV.

Park S et al[19] showed in their randomized, double-blind study that the incidence of PONV was lower in the Palonosetron (42.2%) than in the Ondansetron (66.7%). 90 patients included in this study were allocated into two groups and received either Palonosetron 75mcg or Ondansetron 8mg intravenously. The study concluded that Palonosetron 75 mcg was superior to Ondansetron 8 mg in prevention of PONV in patients undergoing gynaecological laparoscopic procedures.

Bajwa SS et al[20] in 2011, did a randomized controlled trial and showed that single pre-induction IV dose of Palonosetron (75 mcg) proved to be superior to Ondansetron (8 mg). This study was carried out in 30 patients in each group who received either Ondansetron 8mg or Palonosetron 75mcg. The incidence of nausea in their study was 20% in Ondansetron group where as in Palonosetron group it

was 6.67% and the incidence of vomiting in Ondansetron group was 13.33% when compared to Palonosetron group which is 3.33%. From their study it was clear that Palonosetron was superior to Ondansetron.

Moon Y et al[21] in their study included 100 patients and showed that Palonosetron was effective than Ondansetron in high risk patients receiving Fentanyl based PCA following thyroid surgeries in the year 2012. The incidence of PONV at 24 hour period was 42% in Palonosetron group and 62% in Ondansetron group. There was no much difference in Palonosetron and Ondansetron group in the incidence of PONV at 24 hrs post surgery.

Taninder Singh et al[22] have compared the efficacy of Ondansetron and Palonosetron among patients undergoing middle ear surgeries and concluded that the incidence of nausea and vomiting was more in Ondansetron group when compared to Palonosetron group. The complete responder in their study was 40% in Ondansetron group and 73.3% in Palonosetron group.

Kim S et al[23] in 2013 carried out a study in 109 patients, among which 35 patients were in Ondansetron group, 38 in Ramosetron and 36 in Palonosetron group. They evaluated efficacy of Ondansetron 4 mg, Ramosetron 0.3mg and 75mcg of Palonosetron. The incidence of nausea was 22.2% in Palonosetron group where as in Ondansetron it was 77.1% and in Ramosetron it was 60.5%. The incidence of retching was also low in Palonosetron (11.1%) when compared to other two groups. Palonosetron group had 5.6% of vomiting where as Ondansetron group had 28.6% and Ramosetron group 18.4% respectively. The study concluded

that there was lesser incidence of nausea, retching and vomiting in Palonosetron group when it was compared with Ondansetron and Ramosetron.

Saha D et al[24] in 2011, evaluated the antiemetic efficacy of Ramosetron 0.3 mg, Palonosetron 75mcg and Ondansetron 8mg among 29 patients in each group. 65.5 % of patients in Ramosetron group were free of nausea, vomiting and retching, whereas the complete responders were 37.9 % in Palonosetron group and 34.5 % in Ondansetron group. This study showed that Ramosetron 0.3 mg IV was effective than Palonosetron 75mcg and Ondansetron 8mg in the early postoperative period, but noted no significant difference in the overall incidence of PONV. However percentages of complete responders were still high in Palonosetron group when compared to Ondansetron.

Gupta K et al[25] compared the efficacy of Palonosetron, Ondansetron, and Granisetron in PONV among patients undergoing laparoscopic cholecystectomy. This study included 120 patients, with 40 patients in each study group. The incidence of nausea was more in Ondansetron group [50%] when compared with Palonosetron [7.5%] and Granisetron [12.5%] and observed that Palonosetron was superior to Granisetron and Ondansetron. 42.5% of patients in Ondansetron group had vomiting, but it was 7.5% and 20% in Palonosetron and Granisetron groups respectively. The study concluded that Palonosetron is effective than Ondansetron and Granisetron.

Mohamad Ommid et al[26] concluded that prophylactic administration of Granisetron is more effective than Ondansetron, in reducing in incidence of PONV among female patients undergoing laparoscopic cholecystectomy in 2013. In his study, 80% of the patient in Granisetron group did not have PONV where as it was 48 % in Ondansetron group.

Ramya et al[27] compared the efficacy of Ondansetron with Granisetron among patients undergoing laparoscopic cholecystectomy in 2013. In this study 140 patients were included and divided into two groups of 70 patients. The observations in their study were as follows. 6 patients from Ondansetron group and 3 patients from Granisetron group had nausea at extubation. There was a gradual decrease in the incidence of vomiting in both groups with time. On overall comparison, 37% of group Ondansetron had nausea when compared to 23% in the Granisetron group. 16% from the Ondansetron group had vomiting in comparison to Granisetron group which is 3%.They concluded that Ondansetron 80mcg/kg is as efficacious as Granisetron 20mcg/kg.

Bhattacharjee et al[28] reported Palonosetron was more effective than Granisetron in prevention of PONV in the first 24 – 48 hrs post operative period following laparoscopic cholecystectomy. In this study 60 female patients undergoing laparoscopic cholecystectomy were randomized into two groups containing 30 patients each and named as group P and group G. P group received Palonosetron 75mcg intravenously before induction where as group G received Granisetron 2.5 mg intravenously before induction. In first 3 hours post surgery 86.6% with Granisetron group and 90% with Palonosetron group had no PONV

and did not need rescue medication. The incidences of complete responders at 3 to 24 hrs post procedure were also high in Palonosetron group when compared to Granisetron group. There was significant difference in incidence at 24-48 hour period in Granisetron group [66.6%] and 90% in Palonosetron group. Hence this study concluded that Palonosetron is superior to Granisetron.

Park S et al[29] showed no significant difference between Ramosetron and Palonosetron in reducing the incidence of post operative nausea and vomiting among patients undergoing laparoscopic gynecological procedures. In this study, 100 patients undergoing gynecological laparoscopic surgery were enrolled and the medications were provided immediately before the induction of anesthesia as per randomization. The incidence of nausea and vomiting and rescue anti-emetic drug use were monitored at various time periods and observed that the incidence of vomiting was significantly lower in the Palonosetron group when compared to Ramosetron group (6% vs. 26%) during first 6 hours and also at end of 48hrs post surgery(14% vs. 34%).

Blitz J et al[30] evaluated the efficacy of Palonosetron with Dexamethasone for prevention of post operative nausea and vomiting and showed no significant difference in decreasing the incidence of PONV.

Mansour E[31] compared Palonosetron - Dexamethasone, Dexamethasone - Metoclopramide combinations and Dexamethasone alone for prevention of post operative nausea and vomiting. The incidence of PONV was 16% in Palonosetron with Dexamethasone group, 40% in Dexamethasone with Metoclopramide group

and 48% when Dexamethasone was used alone. He concluded that combination of Palonosetron and Dexamethasone was effective in controlling PONV among patients undergoing laparoscopic surgeries when compared to Dexamethasone alone or in Metoclopramide Dexamethasone combination.

Ghosh S et al[7] did a study in 2011 in West Bengal showed that Palonosetron was superior when compared with Dexamethasone – Palonosetron combinations in patients undergoing laparoscopic cholecystectomy under general anaesthesia.

PHYSIOLOGY OF NAUSEA AND VOMITING

Nausea is a subjective sensation of an urge to vomit in the absence of expulsive movements and it might be accompanied with salivation, vasomotor disturbance and sweating[32]. The unproductive effort to vomit is termed as retching[32]. Vomiting is the forcible expulsion through the mouth of the gastric contents[33].

The vomiting center is located in the medulla oblongata. It is comprised of nucleus of the tractus solitarius [NTS] and reticular formation[34]. This center is present near the base of fourth ventricle. When this centre is stimulated the act of vomiting takes place.

The inputs which activate the vomiting centre are from 4 principal areas. They include the gastrointestinal tract, vestibular region, cerebral cortex, thalamus and Chemoreceptor Trigger Zone (CTZ) which is located in floor of 4^{th} ventricle[35]. The figure 1 shows the location of vomiting centre and CTZ. The CTZ is present outside the blood-brain barrier[36].

The act of vomiting [Figure 2] can be grouped in three phases[4]. These phases are pre ejection phase, ejection phase and post ejection phase.

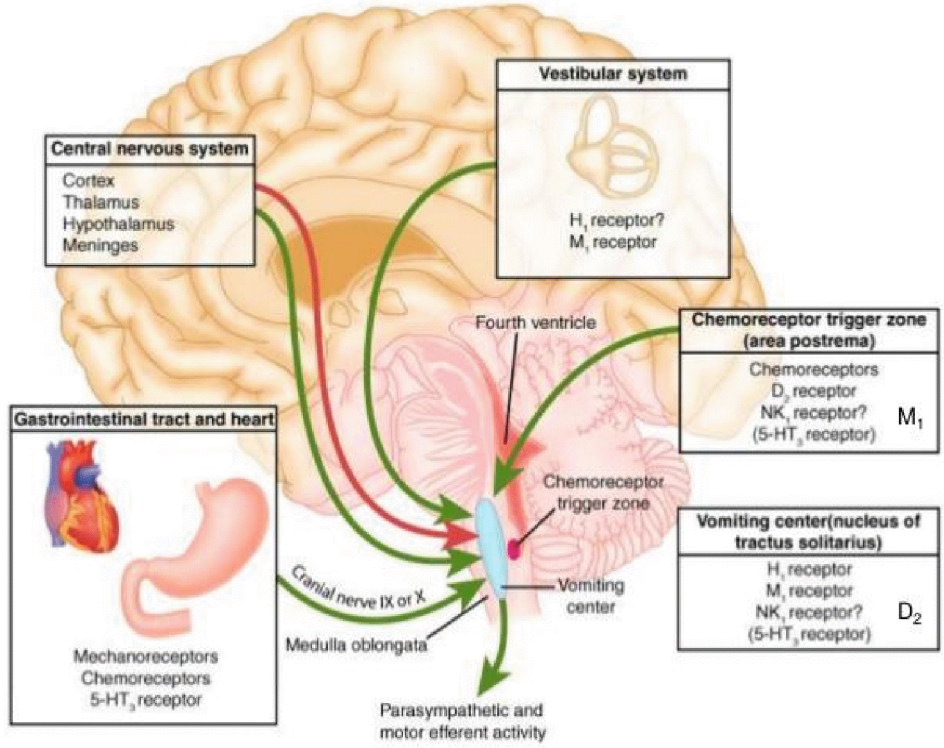


FIGURE 1 - VOMITING CENTRE

Pre ejection phase comprises of nausea with autonomic signs[4]. The autonomic signs are salivation, sweating and tachycardia. The ejection phase[36] includes retching and vomiting. In this phase, there is coordinated contraction of abdominal muscle against a closed glottis which in turn raises intra abdominal and intra thoracic pressures. Following rise in intra abdominal and intra thoracic pressures, pyloric sphincter contracts and the esophageal sphincter relaxes and there is active anti peristalsis which forcibly expels the gastric contents. The final phase includes visceral and autonomic response that brings body to a quiescent phase with or without nausea[4].

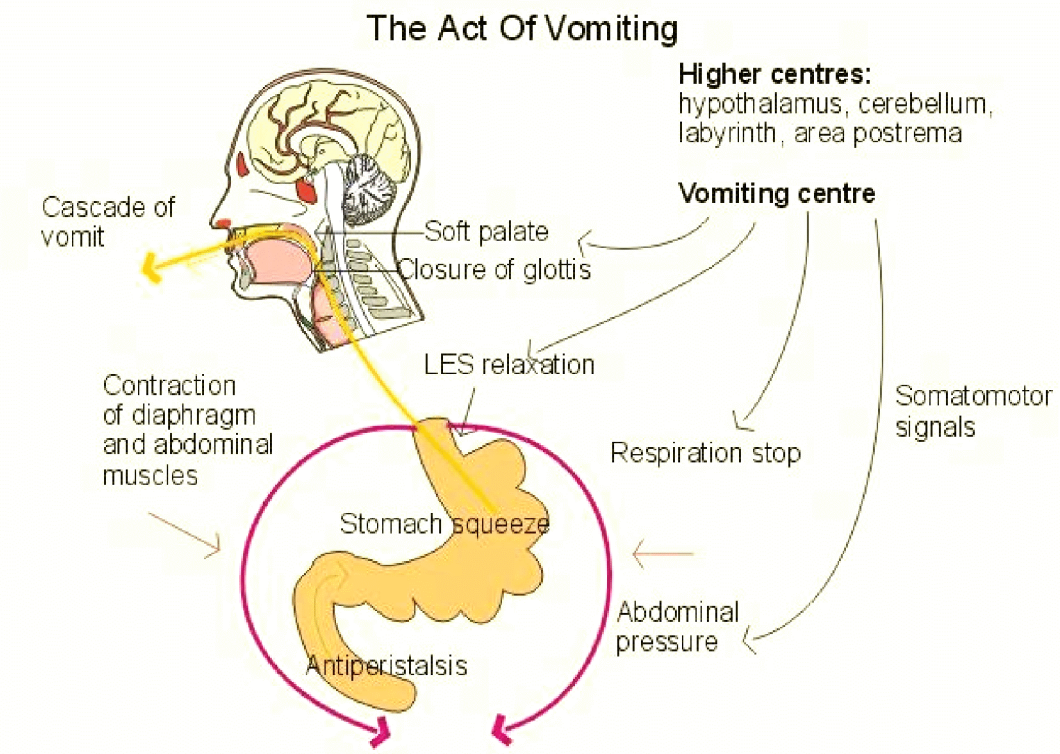


FIGURE 2 - ACT OF VOMITING

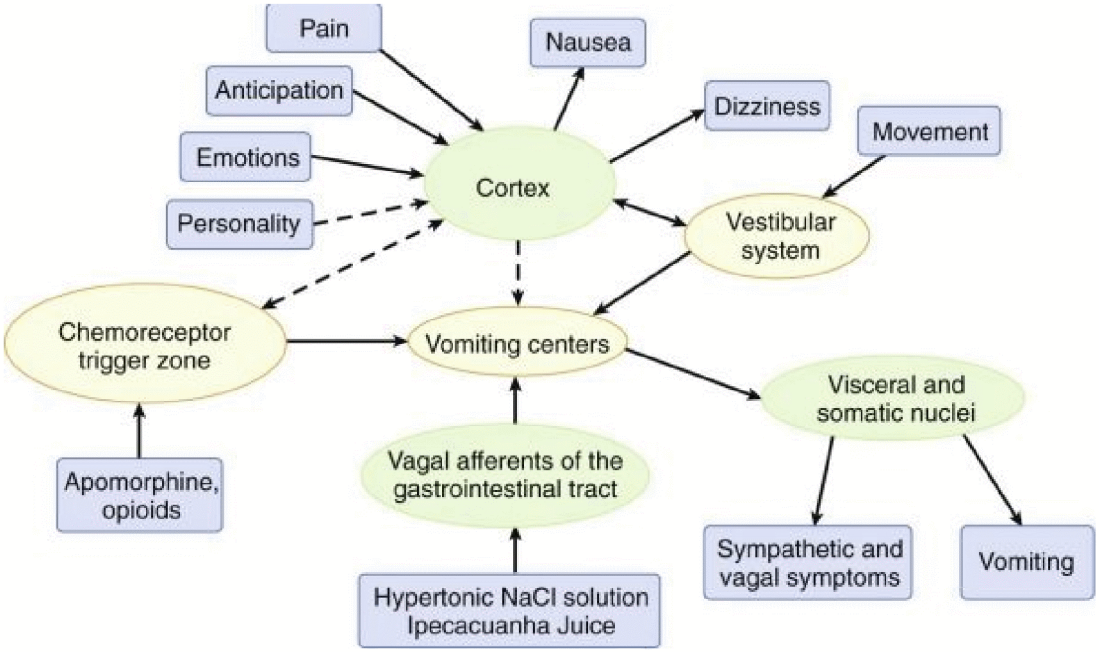


FIGURE 3 - PATHWAYS FOR NAUSEA AND VOMITING

Immunochemical studies shows that these areas contain Histamine, Cholinergic, Serotonin, Neurokinin-1, and D_2 [Dopamine] receptors. This receptor stimulates CTZ and causes nausea and vomiting. Figure 4 shows CTZ and receptor site and its attachments.

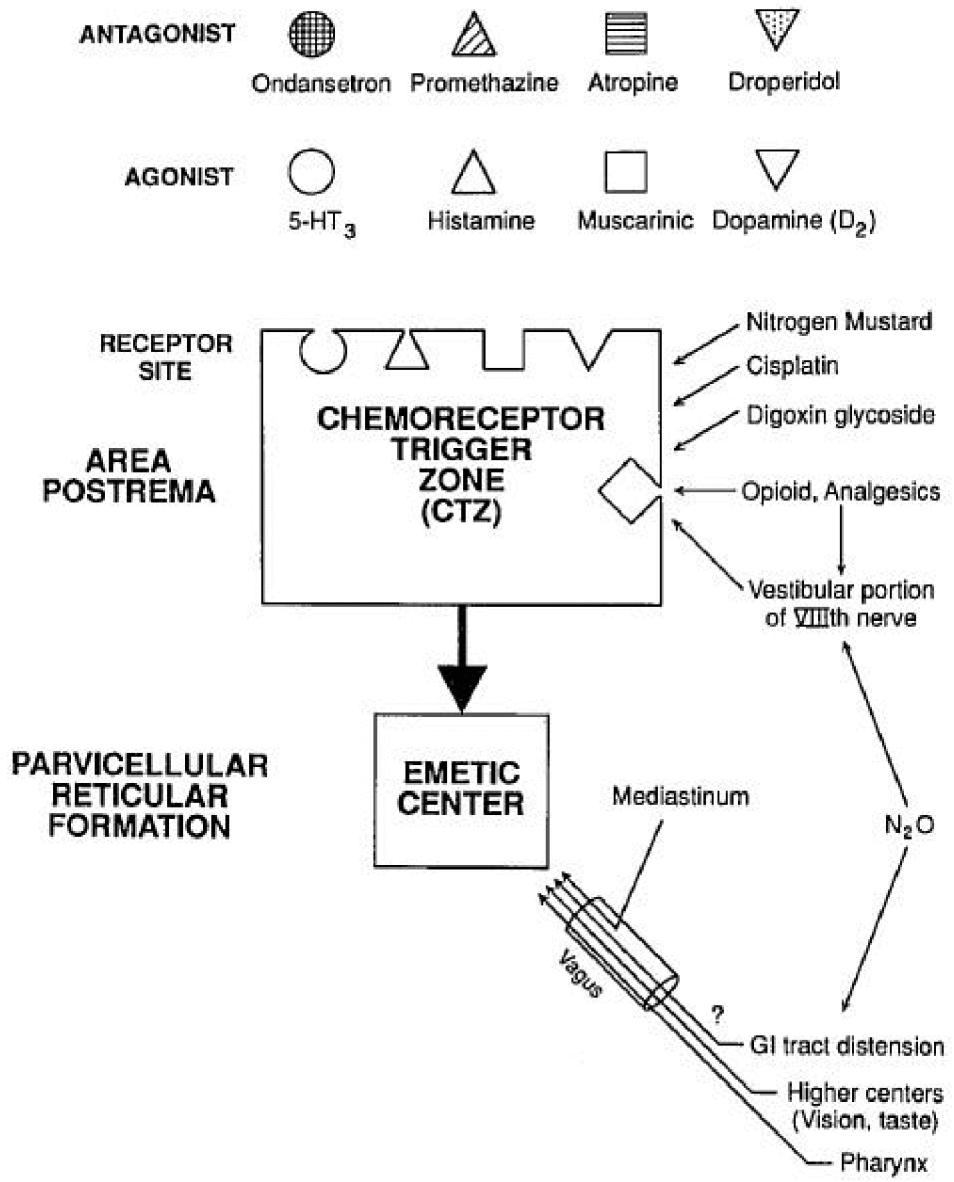


FIGURE 4 - CTZ AND ITS RECEPTOR SITE

RISK FACTORS FOR POST OPERATIVE NAUSEA AND VOMITING

The risk factors for post operative nausea and vomiting can be grouped as following.

1. **Patient related factors**
    a. Gender
    b. Age
    c. Non smokers
    d. History of PONV and motion sickness
    e. Obesity

2. **Anaesthesia related factors**
    a. Postoperative use of opioids
    b. Duration of anaesthesia
    c. Use of Nitrous oxide and inhalational agents

3. **Surgery related factors**
    a. Ophthalmic surgery, ENT surgery, gynecological surgery, laparoscopic procedures and thyroid surgery

PATIENT RELATED FACTORS

Patient related factor include age, gender, obesity, non smokers and history of motion sickness and previous history of PONV.

Females are more prone for nausea and vomiting due to the effects of Follicular Stimulating Hormone [FSH] and Estrogen on CTZ. But this difference is not seen in children and people aged more than 60 years of age[36].

There is a varying incidence of post operative nausea and vomiting in different age groups[3]. The incidence of PONV is about 14 – 40 % in adults and it is still higher in age group of 6 –16 years whose incidence is 42–50 %.

Non smoker carries more risk than smokers as per the study done by Cohen et al[37]. The incidence of PONV is more in patients with preexisting known cases of PONV and motion sickness [36].

Patient's whose Body Mass Index [BMI] is more than 30 have increased chance of post operative nausea and vomiting[3]. This might be due to prolonged half life of lipophilic drugs.

Apfel et al[5] devised a simplified risk score to predict the incidence of post operative nausea and vomiting. These factors include female gender, non smokers, history of post operative nausea and vomiting and post operative use of opioids. The study done by them has shown the incidence of PONV varies with the presence of risk factors.

ANAESTHESIA RELATED FACTORS

Postoperative use of opioids, duration of anaesthesia, use of Nitrous oxide and inhalational agents are the anaesthesia related factors which influences PONV.

The incidence of PONV is doubled when opioids is used during post operative period[3, 36, 38].

Use of Nitrous oxide increases the incidence of nausea and vomiting. The mechanisms behind this are as follows.

a. Stimulation of sympathetic nervous system which releases catecholamine[39, 40]
b. Change in middle ear pressure which in turn stimulates vestibular system[41]
c. Increased abdominal distension[42]

Alexander et al and Lonie et al have shown that there is decrease in incidence of post operative nausea and vomiting when nitrous oxide is avoided[4].

The incidence of PONV is more following general anaesthesia when compared to regional anaesthesia[43]. Central neuraxial blockade has more incidence of PONV when compared to peripheral blockade[34].

SURGERY RELATED FACTORS

The surgeries which increase the incidence of post operative nausea and vomiting are as follows[3, 36]

a. Ophthalmic surgery
b. ENT surgery
c. Gynecological surgery
d. Laparoscopic procedures
e. Thyroid surgery

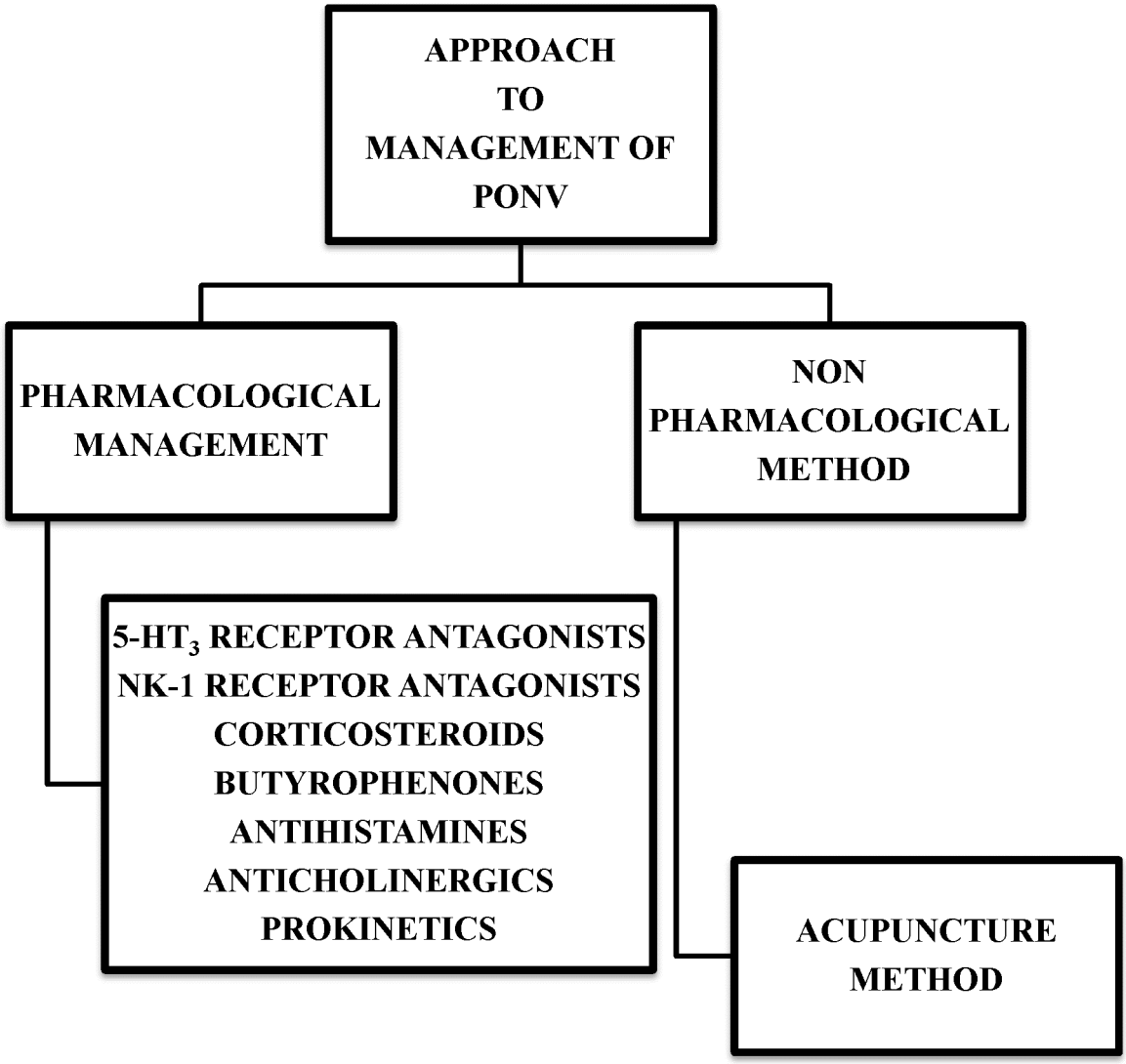
The incidences in laparoscopic surgeries are mostly due to pneumo peritoneum which stimulates vagus nerve and causes PONV.

The incidence is more when the duration of surgery is prolonged as they get exposed to emetogenic stimuli for longer time.

APPROACH TO MANAGEMENT OF PONV

The Management of PONV includes pharmacological methods and non pharmacological methods. The management of PONV by non pharmacological method is by acupuncture method.

FIGURE 5 APPROACH TO MANAGEMENT OF PONV



The pharmacological management of PONV includes various groups of drugs. They are 5-HT_3 receptor antagonists, NK – 1 receptor antagonists, Corticosteroids, Butyrophenones, Antihistamines, Anticholinergics and Prokinetics. Table 1 shows groups of drugs for management post operative nausea and vomiting.

TABLE 1 PHARMACOLOGICAL MANAGEMENT OF PONV

GROUPS	DRUGS
5-HT_3 Receptor Antagonists	Ondansetron Dolasetron Ramosetron Tropisetron Granisetron Palonosetron
NK – 1 Receptor Antagonists	Aprepitant Casopitant Rolapitant
Corticosteroids	Dexamethasone Methylprednisolone
Butyrophenones	Droperidol Haloperidol
Antihistamines	Dimenhydrinate Meclizine
Anticholinergics	Transdermal Scopolamine
Prokinetics	Metoclopramide Domperidone Prochlorperazine

5-HT_3 RECEPTOR ANTAGONISTS

These groups of drugs act on $5HT_3$ receptor and bring down the incidence of nausea and vomiting. The drugs belonging to this group are Ondansetron, Dolasetron, Ramosetron, Tropisetron, Granisetron and Palonosetron. Ondansetron is a first generation drug and Palonosetron is a second generation $5HT_3$ receptor antagonist.

NK-1 RECEPTOR ANTAGONISTS

NK-1 receptor antagonists provide antiemetic activity by suppressing activity at the NST [Nucleus of the Solitary Tract] receptor. This group includes drug like Aprepitant, Casopitant and Rolapitant. The use of these drugs for prevention of nausea and vomiting are not fully established.

PROKINETICS

This group of drug acts on D_2 receptors and enhances gastrointestinal motility. Metoclopramide, Domperidone and Prochlorperazine are the drugs belonging to this group.

CORTICOSTEROIDS

Dexamethasone decreases incidence of nausea and vomiting. Though the mechanism is not fully understood, the probable mechanism is by involving central inhibition of prostaglandin synthesis, anti-inflammatory action and decrease in secretion of 5-HT from GI tract[45]. Methylprednisolone also decreases incidence nausea and vomiting. These drugs are given at time of induction.

BUTYROPHENONES

Droperidol and Haloperidol are the drugs used in management of post operative nausea and vomiting. Prophylactic dose of Droperidol 0.625 to 1.25mg when given as intravenously decreases the incidence of PONV. But its use also declined due to cardiovascular toxicity.

Table 2 shows various antiemetic drugs and its dose and time of administration.

NON PHARMACOLOGICAL METHOD

This method of approach to management of post operative nausea and vomiting as also reduced the incidence of post operative nausea and vomiting. Coloma et al.[46] compared acustimulation with Ondansetron for the treatment of PONV in laparoscopic surgery patients. They concluded that acustimulation may be a satisfactory alternative to Ondansetron.

TABLE 2 ANTIEMETIC DRUGS AND ITS DOSE AND TIME OF ADMINISTRATION

DRUG	DOSE	TIME OF ADMINIISTRATION
Aprepitant	40mg per oral	At induction
Casopitant	150mg per oral	At induction
Dexamethasone	4 – 5mg IV	At induction
Dimenhydrinate	1 mg/kg IV	At induction
Dolasetron	12.5mg IV	At end of surgery
Droperidol	0.625 – 1.25 mg IV	At end of surgery
Gabapentin	600 mg per oral	2 hours before
Granisetron	0.35 – 3mg IV	At end of surgery
Haloperidol	0.5 – 1.5 mg IM/IV	At induction
Metoclopramide	10mg IM/IV	At end of surgery
Methylprednisolone	40mg IV	At induction
Ondansetron	4mg IV	At end of surgery
Palonosetron	75mcg IV	At induction
Ramosetron	0.3mg IV	At end of surgery
Rolapitant	70 – 200 mg per oral	At induction
Tropisetron	2mg IV	At end of surgery
Transdermal Scopolamine	Patch	2 hours before surgery

PHARMACOLOGY OF PALONOSETRON

Palonosetron is a newly developed $5HT_3$ receptor antagonist approved for management of post operative nausea and vomiting in 2008 and it is currently used for prophylactic management of PONV[8]. It is a second generation $5HT_3$ receptor antagonist with prolonged duration of action.

Palonosetron structure varies from other $5HT_3$ receptor antagonist. It is a single stereoisomer of isoquinoline derivative. It is different from other $5HT_3$ receptor antagonist by a fused tricyclic ring system attached to a quinuclidine moiety[46].

C_{19} $H_{24}N$ $_2O.HCl$ is the empirical formula of Palonosetron hydrochloride whose molecular weight is 332.87[47].

(3aS) - 2 - [(S) - 1 - Azabicyclo[2.2.2]oct - 3 - yl] - 2,3,3a,4,5,6 - hexahydro - 1 - oxo - 1Hbenz[de] isoquinoline hydrochloride is the chemical formula for Palonosetron[46].

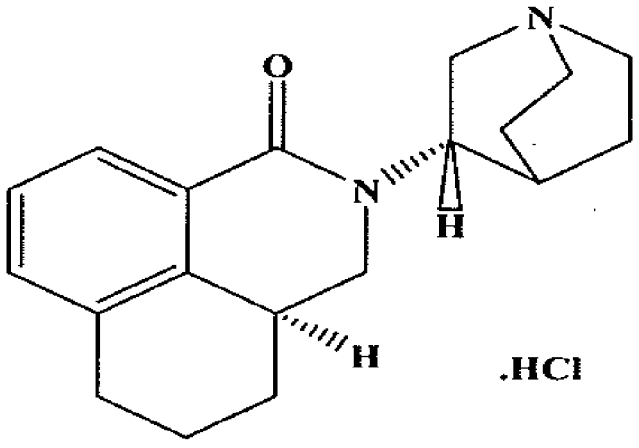


FIGURE 6 STRUCTURE OF PALONOSETRON

Palonosetron has greater affinity to $5HT_3$ receptors. The binding affinity of Palonosetron to $5HT_3$ receptor is 10.4. The binding affinity of Palonosetron is high when compared to that of other $5HT_3$ receptor antagonists[8, 48].

Palonosetron binds to its receptor site by positive co - operativity and allosteric binding where as the first generation drugs binds to receptor site by competitive binding[49]. Palonosetron has longer half life of 40 hrs which is due to internalization of the 5-HT3 receptor; and this facilitates the attachment of additional molecules of the Palonosetron after the attachment of 1st molecule to the receptor site[50].

The effect of Palonosetron on blood pressure, heart rate and ECG parameters were comparable to Ondansetron in clinical trials. The dose response relationship with QTc interval is not fully evaluated.

The volume of distribution Palonosetron is 8.3±2.5 l/kg and 62 % of the drug is bound to proteins[46]. Palonosetron gets metabolized in liver. The cytochrome P450 enzymes plays role in metabolism of the drug with CYP2D6 as primary iso enzyme and CYP3A4 & CYP1A2 as secondary iso enzymes[8]. The metabolites of the drug Palonosetron are N-oxide-Palonosetron and 6-(S)-hydroxy-Palonosetron[8, 46]. The drug is mainly eliminated by kidneys[51].

There is no drug interaction when given along with Dexamethasone and Metoclopramide. There are incidence of profound hypotension and altered level of consciousness when given with Apomorphine.

The studies have shown that the drug Palonosetron needs no dose adjustment in elderly patients[51, 52]. The use of Palonosetron in pregnant women is not fully established, though there are animal studies which show that there is no interference with fetal development and it is assigned as Category – B[46]. Similarly there is no much evidence for safe use of Palonosetron in lactating mothers[8]. The use of drug in children is not fully evaluated.

The drug is administered as a single dose of 75 mcg administered intravenously over 10 seconds duration just before induction of anaesthesia.

The co administration with Apomorphine is contraindicated as it causes profound hypotension and loss of consciousness.

The side effects of the drug are headache, abdominal discomfort, transient increase in liver enzyme levels and dizziness. No significant change in QTc from baseline ECG and Holter monitoring were found[53].

PHARMACOLOGY OF ONDANSETRON[54, 55, 56]

Ondansetron is a selective $5HT_3$ receptor antagonist. Ondansetron was the first $5HT_3$ drug introduced in 1991 used for management of both CINV and PONV. It is a carbazalone derivative.

The molecular formula for Ondansetron is $C_{18}H_{19}N_3O \cdot HCl \cdot 2H_2O$. The molecular weight of Ondansetron is 365.9.

The chemical formula for Ondansetron is (±) 1, 2, 3, 9-tetrahydro-9-methyl-3-[(2-methyl-1H-imidazol-1-yl) methyl]-4H–carbazol-4-one, mono hydro chloride, dihydrate.

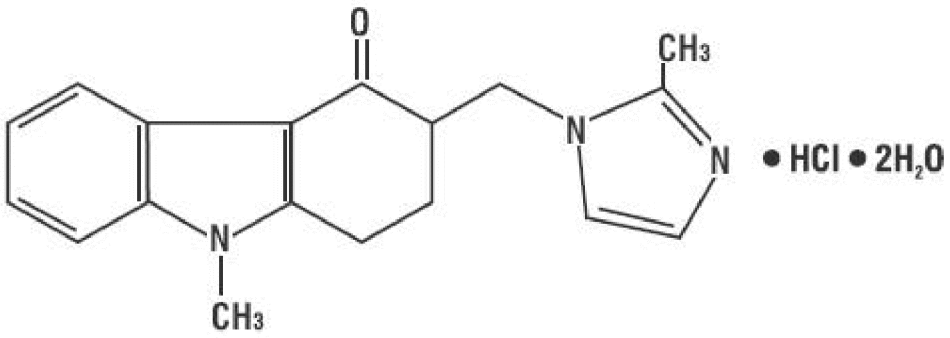


FIGURE 7 - STRUCTURE OF ONDANSETRON

Ondansetron is available in both oral and parental preparation. It undergoes first pass metabolism. Oral bioavailability of Ondansetron is 60–70 %.

Ondansetron acts by blocking the depolarizing action of 5HT through $5HT_3$ receptors on vagal efferent as well as in NTS and CTZ. These drugs block the stimuli both at peripheral and central level and thus prevent nausea and vomiting.

Ondansetron is exclusively metabolized in liver. It undergoes hydroxylation followed by glucuronide or sulfate conjugation. The enzymes responsible for the metabolism are CYP1A2 and CYP2D6. The metabolites of Ondansetron are 7-hydroxyOndansetron or 8-hydroxyOndansetron. The drug gets eliminated in urine and faeces.

The drug is widely distributed and 70 – 75 % of the drug is bound to plasma proteins. The $t_{1/2}$ of the drug is 3 – 5 hrs and its duration of action ranges between 4 – 12 hours. The recommended dose for post operative nausea and vomiting is 4 – 8 g administered intravenously just before induction of anaesthesia.

The dose adjustments are not required in elderly. The duration of action is increased in patients with severe hepatic derangement and the dose should not exceed more than 8 mg per day.

The drug is assigned as Category –B in pregnant group and there are very few studies in animals to show that the drug is secreted in milk. There are no studies to prove that the drug is secreted in milk in humans.

The side effects of Ondansetron are headache, mild constipation or diarrhea and abdominal discomfort. Transient ECG changes including QT interval prolongation are reported in studies when given intravenously. Table 3 shows the comparative pharmacology between Ondansetron and palonosetron.

TABLE 3 - COMPARATIVE PHARMACOLOGY BETWEEN ONDANSETRON AND PALONOSETRON

	ONDANSETRON	PALONOSETRON
$5HT_3$ Generation	First	Second
Chemical formula	(±) 1, 2, 3, 9-tetrahydro-9-methyl-3-[(2-methyl-1H-imidazol-1-yl) methyl]-4H–carbazol-4-one, mono hydro chloride, dihydrate.	(3aS)-2-[(S)-1-Azabicyclo[2.2.2]oct-3-yl]-2,3,3a,4,5,6-hexahydro-1-oxo-1Hbenz[de] isoquinoline hydrochloride
Empirical formula	$C_{18}H_{19}N_3O \cdot HCl \cdot 2H_2O$	$C_{19}H_{24}N_2O.HCl$
Molecular weight	365.9	332.87
Binding affinity	8.07	10.4
Dose	4mg [For PONV]	75mcg [For PONV]
Time of Administration	At end of surgery	During induction
Preparations available	Oral Intravenous Intramuscular Rectal	Oral Intravenous
Metabolism	Hepatic	Hepatic
Primary pathway	CYP3A4	CYP2D6

	ONDANSETRON	**PALONOSETRON**
Secondary pathway of metabolism	CYP1A2 CYP2D6 CYP2E1	CYP3A4 CYP1A2
Bio availability	60%	97%
Half life	3 – 5 hours	40 hours
Volume of distribution	1.8l/kg	8.3±2.5 l/kg
Protein bound	70 – 75%	62%
Metabolites	7-hydroxyOndansetron 8-hydroxyOndansetron	N-oxide-palonosetron 6-S-hydroxy-palonosetron
Elimination	Renal	Renal
QT interval	Prolongs in dose dependent manner	<1% in dose dependent manner. No incidence at lower doses
Use in pregnancy	Category B1	Category B1
Use in Lactating Women	Secreted in milk [Animal studies]	Not established
Use in elderly	No dose adjustments	No dose adjustments

METHODOLOGY

4. METHODOLOGY

After obtaining Institutional Human Ethics Committee clearance the study entitled **"To compare the efficacy of Palonosetron over Ondansetron in prevention of postoperative nausea and vomiting in patients undergoing laparoscopic cholecystectomy under general anesthesia"** was carried out in PSGIMS&R during July 2014 – May 2015.

SAMPLE SIZE DETERMINATION

Approximately 50 subjects in each group is needed to detect two third reduction in the frequency of PONV from the control treatment [from 40% to 15%] with 80% power and 5% probability of type I error.

$\alpha = 0.05$ $Z\alpha = 1.96$ $\beta = 0.20$ $Z\beta = 0.84$

$P = 27.5$ $q = 72.5$ $pt - pc = 25$

$$N = \frac{2 \times (Z\alpha + Z\beta)^2 \times p \times q}{(pt - pc)^2}$$

$N = 49$

{Where N = Sample size for each group}

INCLUSION CRITERIA

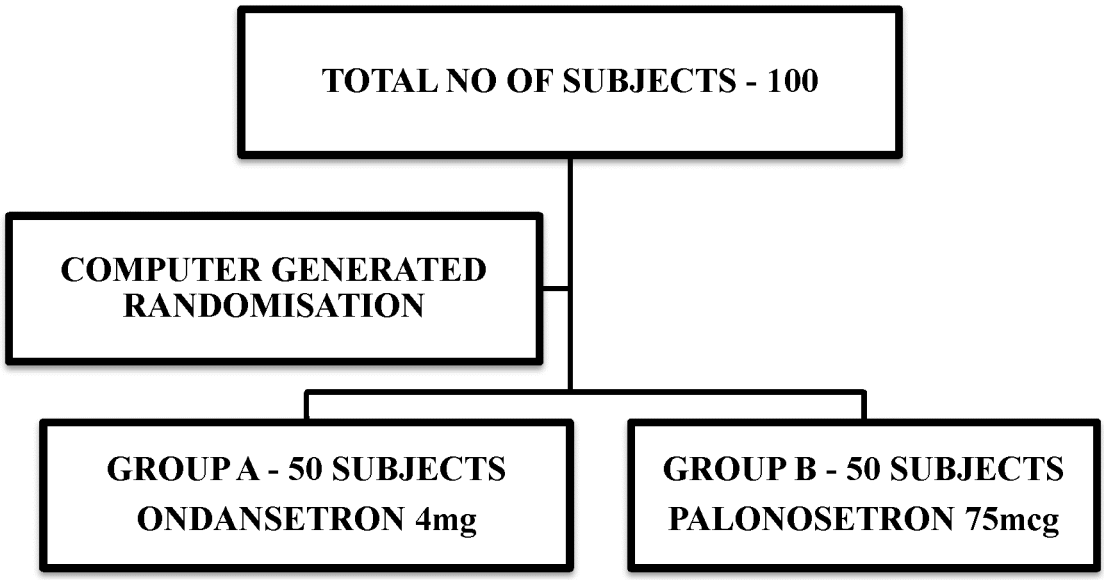
- Patients undergoing laparoscopic cholecystectomy under GA
- Patients aged more than 18 years and less than 60 years
- ASA PS 1 and 2
- Both genders

EXCLUSION CRITERIA

- Pregnancy
- BMI more than 30%
- Emergency surgeries
- Nausea, vomiting or retching within 24 hrs prior to surgery or use of drugs with known emetic or antiemetic effect within 24 hrs prior to surgery
- ASA PS 3 and above
- Intestinal obstruction
- Condition causing raised Intra Cranial Pressure
- Known hypersensitivity to study medication

A total of 100 patients who were posted for laparoscopic cholecystectomy belonging to ASA Class I & II were included in the study. These patients were randomized into 2 groups of 50 each by computer generated randomized numbers as shown in figure 8. All the patients were included in the study after obtaining informed written consent from the patients.

FIGURE 8 METHODLOGY



After routine pre anaesthetic check up, all the patients received tablet Ranitidine 150mg as pre medication at night the previous day of surgery and on morning the day of surgery. On arrival in the operation theatre, pre induction monitoring devices like ECG, NIBP and pulse oximetry were placed. A suitable peripheral vein was cannulated for administration of drugs and IV fluids.

The study medication [Palonosetron 75mcg or Ondansetron 4mg] was given just before induction of anaesthesia, as per the randomization code.

The patients belonging to Group – A received Inj. Ondansetron 4mg just before induction of anaesthesia and patients belonging to Group – B received Inj. Palonosetron 75mcg just before induction of anaesthesia.

The patients were premedicated with Inj.Glycopyrrolate 0.2mg IV, provided analgesia with Inj.Fentanyl 2 mcg/kg IV, induced with Inj. Propofol 2mg/kg IV and intubated using Inj. Suxamethonium chloride 2 mg/kg IV. Anaesthesia was maintained with titrated concentration of Isoflurane, Nitrous oxide with Oxygen in the ratio of 1:1 and Vecuronium. Inj. Dexmedetomidine 0.5mcg / kg in 100 ml 0.9% NS was given before induction over 10 minutes followed by 0.5 mcg / kg for an hour as infusion after induction.

Ventilation was mechanically controlled to maintain $ETCO_2$ at 35 – 45 mmHg throughout the surgery. Nasogastric [NG] tube was inserted post intubation and removed at the time of extubation. Suctioning of NG tube was done both after insertion and before the time of removal. Inj. Diclofenac 75mg in 100 ml NS was given 30 minutes before extubation and repeated eight hourly during first post operative day. Local anaesthetics were used for infiltration of skin around the laparoscopic port sites. Inj.Glycopyrrolate 10 mcg/kg and Inj. Neostigmine 50 mcg/kg was used for reversal of neuromuscular blockade.

All patients were followed for 24 hours post operatively. The incidences of nausea, retching and vomiting were observed postoperatively during 2 hrs, 6 hrs and 24 hrs post procedure interval period. Patients with single episode of vomiting any time during the follow up period received Metaclopromide 10mg IV as rescue medication. The need for rescue medication was also observed. Patients who were free of nausea, retching and vomiting were considered as complete responders. Side effects of the study drug like headache, abdominal discomfort, constipation and dizziness were also monitored during the first 24 hrs post surgery.

OBSERVATIONS & RESULTS

5. OBSERVATIONS AND RESULTS

STATISTICAL ANALYSIS

All the 100 patients were included for the statistical analysis. Data collected were entered in Excel Spread sheet and the analysis was performed using Statistical Package for the Social Sciences (SPSS) version 19 software.

Each group had 50 patients

GROUP – A = ONDANSETRON GROUP

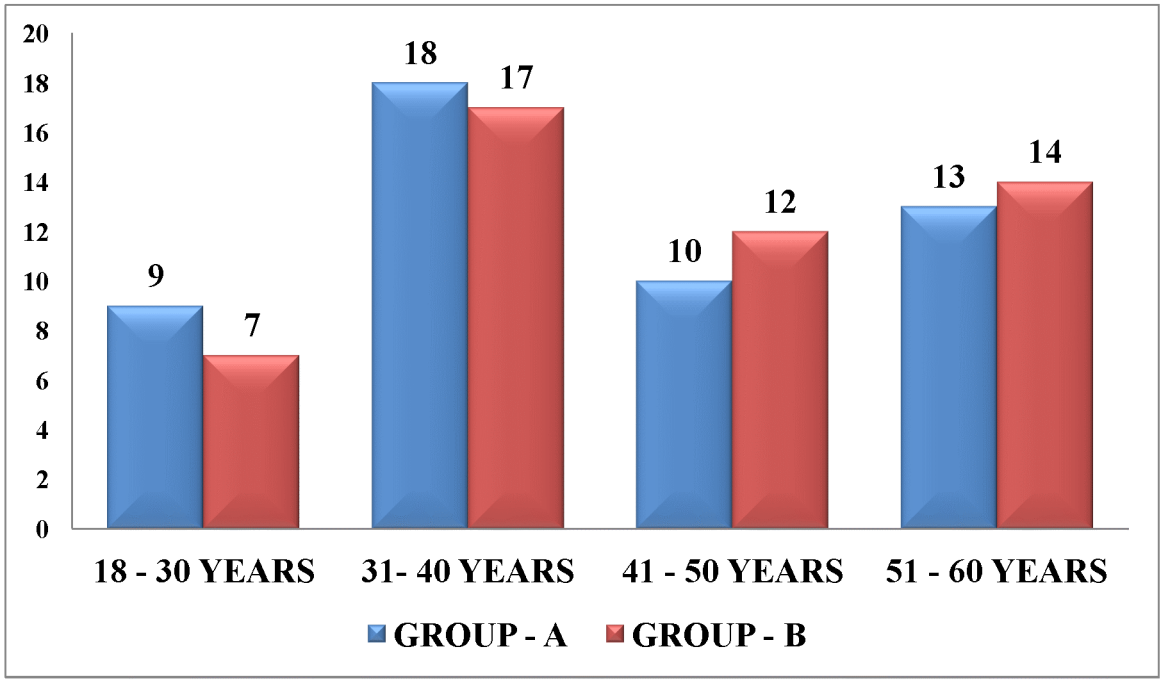
GROUP – B = PALONOSETRON GROUP

The chi square test and independent T test were done for continuous variables and categorical variables analysis respectively. **"p value of < 0.005" was considered to be statistically significant in this study.**

TABLE 4 - AGE DISTRIBUTION AMONG TWO GROUPS

AGE IN YEARS	GROUP – A [ONDANSETRON]		GROUP – B [PALONOSETRON]	
	No. of Patients	Percentage	No. of Patients	Percentage
18 – 30	9	18	7	14
31 – 40	18	36	17	34
41 – 50	10	20	12	24
51 – 60	13	26	14	28
Total	50	100	50	100
Mean age in years ± S.D	40.78 ± 10.73		41.84 ± 10.57	
t Value	0.49			
p Value	0.620			

FIGURE 9 - AGE DISTRIBUTION AMONG GROUPS

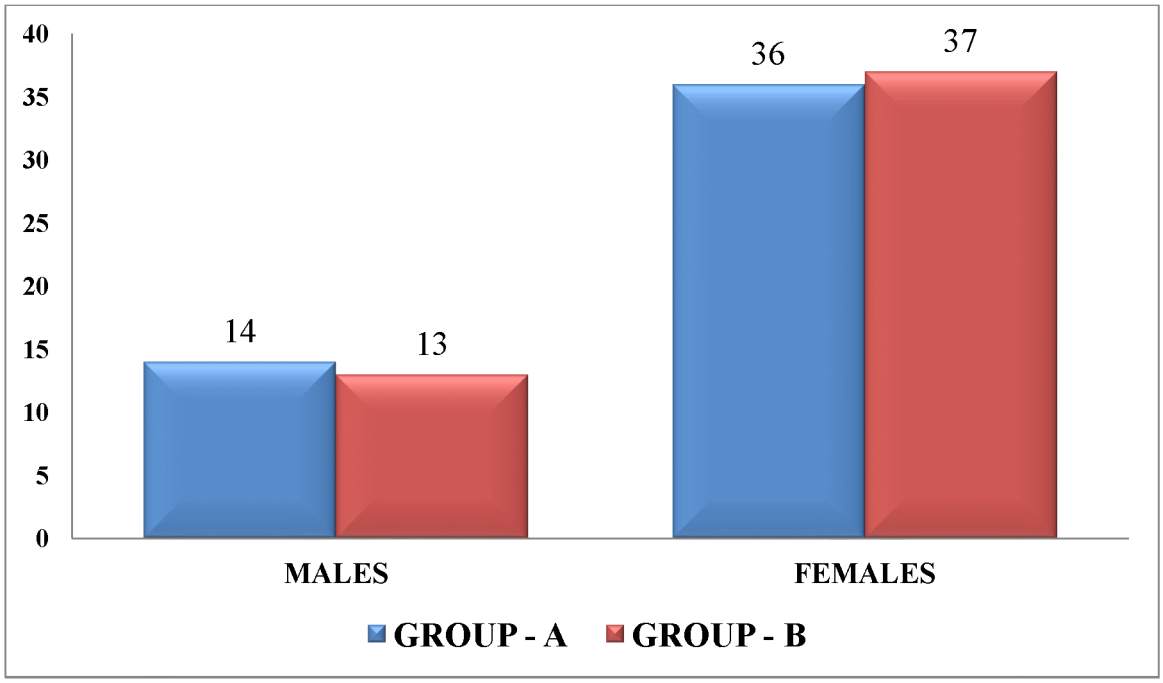


The table 4 and figure 9 shows age wise distribution among group A and B. The mean age in Group A and Group B was 40.78 ± 10.73 and 41.84 ± 10.57 respectively. The p value 0.620 showed no statistical significance among both groups.

TABLE 5 - GENDER DISTRIBUTION AMONG GROUPS

GENDER	GROUP – A [ONDANSETRON]		GROUP – B [PALONOSETRON]		χ^2	p Value
	No. of Patients	Percentage	No. of Patients	Percentage		
Males	14	28	13	26	0.51	0.822
Females	36	72	37	74		
Total	50	100	50	100		

FIGURE 10 - GENDER DISTRIBUTION AMONG GROUPS



The table 5 and figure 10 shows gender distribution in Ondansetron and Palonosetron groups. The p value is more than 0.05. There is no statistical significance among both the groups in terms of gender.

TABLE 6 - ANTHROPOMETRIC DISTRIBUTION AMONG GROUPS

		MEAN	S.D.	t	p value
HEIGHT [cm]	**GROUP – A**	159.74	± 8.56	0.364	0.716
	GROUP – B	160.37	± 8.73		
WEIGHT [kg]	**GROUP – A**	63.62	± 7.84	0.645	0.520
	GROUP – B	64.64	± 7.96		
BMI	**GROUP – A**	24.98	± 2.96	0.365	0.716
	GROUP – B	25.19	± 2.76		

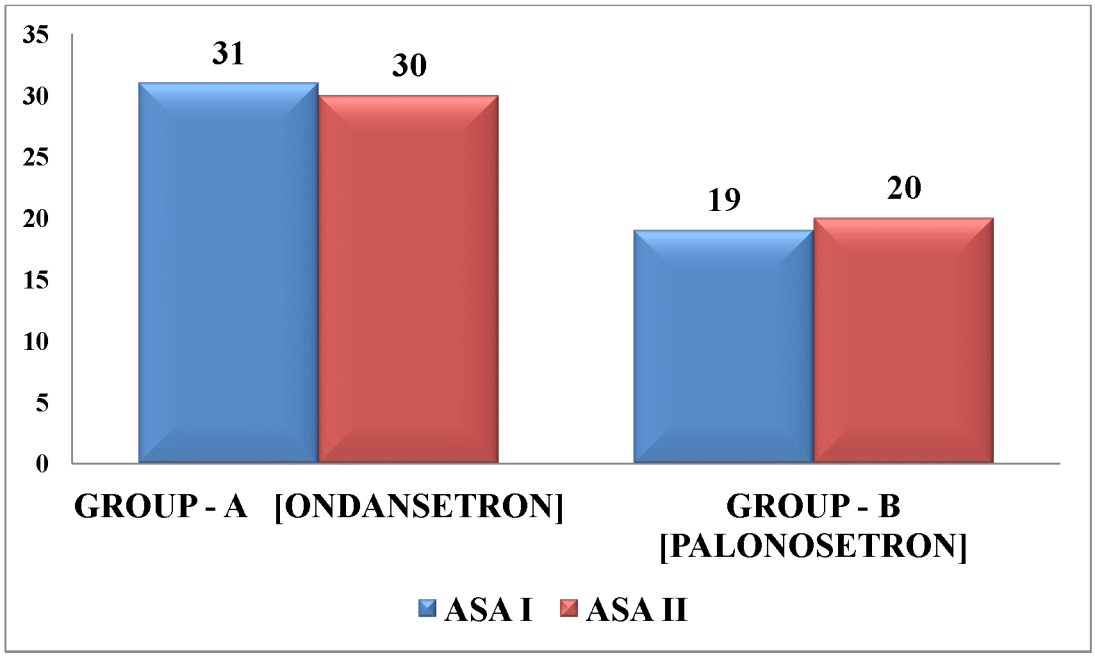
GROUP A – ONDANSETRON **GROUP B – PALONOSETRON**

The table 6 shows average anthropometric in both groups. The mean height is 159.74 cm and 160.37 cm in Group A and Group B respectively. The average weight in Group A is 63.62 kg where as in Group B is 64.64kg. The body mass index average in Group A is 24.98 where as in Group B is 25.19. The p value for height, weight and body mass index is more than 0.05 and are not statistically significant.

TABLE 7 - DISTRIBUTION OF ASA GRADES IN TWO GROUPS

ASA GRADES	GROUP – A [ONDANSETRON]		GROUP – B [PALONOSETRON]	
	No. of Patients	Percentage	No. of Patients	Percentage
I	31	62	30	60
II	19	38	20	40
Total	50	100	50	100
χ^2	0.42			
p value	0.838			

FIGURE 11 - DISTRIBUTION OF ASA GRADES IN TWO GROUPS

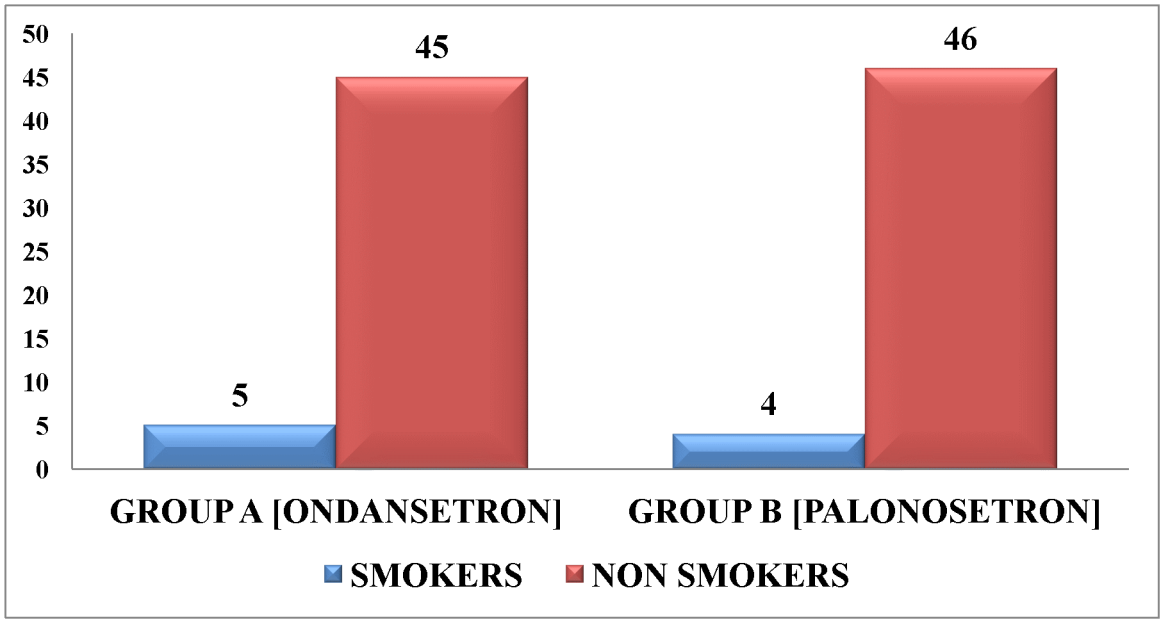


The table 7 & figure 11 shows distribution of ASA grades in Group A & Group B. The p value 0.838 showed statistical insignificance with regard to ASA grade distribution among both the groups.

TABLE 8 - SMOKING STAUS BETWEEN TWO GROUPS

SMOKING STATUS	GROUP A [ONDANSETRON]		GROUP B [PALONOSETRON]	
	No. of Patients	Percentage	No. of Patients	Percentage
Yes	5	10	4	8
No	45	90	46	92
Total	50	100	50	100
χ^2	0.122			
p VALUE	0.727			

FIGURE 12 - SMOKING STATUS BETWEEN TWO GROUPS

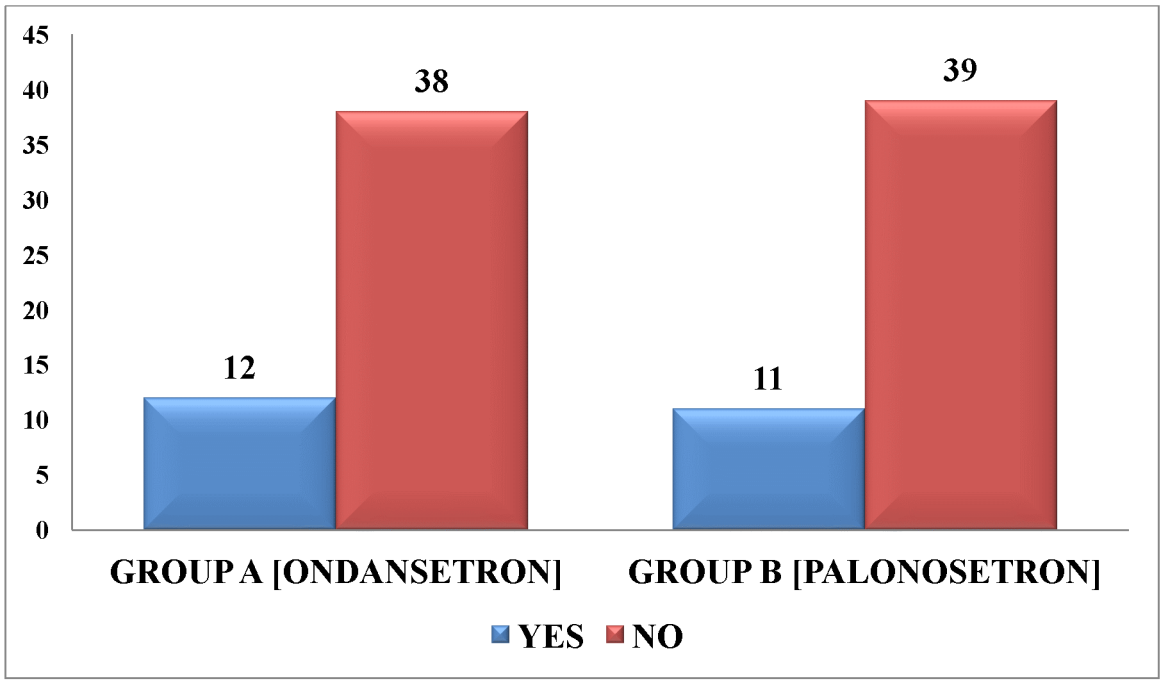


The table 8 and figure 12 shows smoking status among Ondansetron and Palonosetron group. 90% of the patients were non smokers in Ondansetron group and 92% of them in Palonosetron group. There is no statistical difference between both the groups as p value is not less than <0.05.

TABLE 9 - HYPERTENSIVE STATUS BETWEEN TWO GROUPS

	HYPERTENSION		χ^2	p value
	Yes	No		
GROUP A ONDANSETRON	12 [24%]	38 [76%]	0.056	0.812
GROUP B PALONOSETRON	11 [22%]	39 [78%]		

FIGURE 13 - HYPERTENSIVE STATUS BETWEEN TWO GROUPS

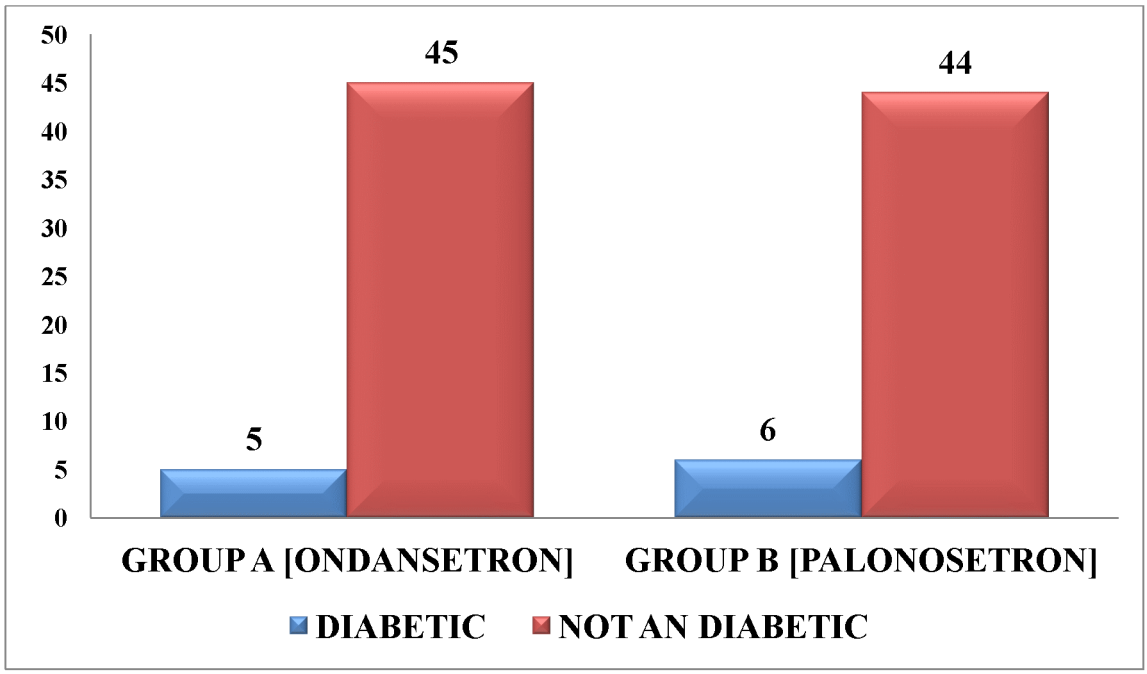


The table 9 and figure 13 shows that 24 % patients in Ondansetron group and 22 % patients in Palonosetron group were hypertensive. There is no statistical significance between them as p value is more than 0.05

TABLE 10 - COMPARISON OF DIABETIC STATUS IN BOTH GROUPS

	DIABETIC		χ^2	p value
	Yes	No		
GROUP A ONDANSETRON	5 [10%]	45 [90%]	0.102	0.749
GROUP B PALONOSETRON	6 [12%]	44 [88%]		

FIGURE 14 -COMPARISON OF DIABETIC STATUS IN BOTH GROUPS



The table 10 and figure 14 shows the comparison of patients with diabetes in both groups. In this study, 10% of them were diabetic in Ondansetron group and 12% in Palonosetron group, with p value 0.749 showing no statistical significance.

TABLE 11 - DISTRIBUTION OF PROCEDURE TIME BETWEEN THE GROUPS

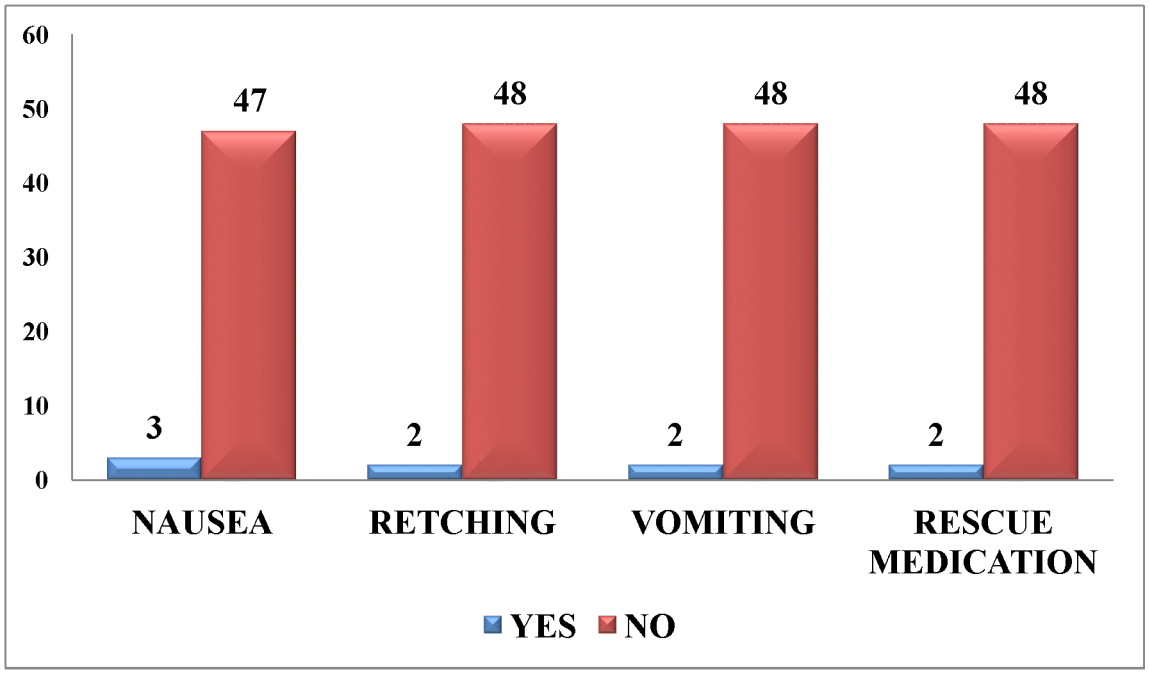
	GROUP A ONDANSETRON		GROUP B PALONOSETRON		t	p Value
	MEAN	S.D.	MEAN	S.D.		
Duration of General Anaesthesia [min]	151.20	±44.29	143.94	±54.72	0.729	0.468
Duration of Surgical procedure [min]	131.20	±43.56	122.50	±53.22	0.895	0.373
Duration of pneumo peritoneum [min]	120.92	±43.35	112.54	±53.05	0.865	0.389

The average duration of general anaesthesia in Group A is 151.20 minutes where as in Group B is 143.94 minutes. The average time of surgical procedure in Group A is 131.20 minutes where as in Group B is 122.50 minutes with average pneumo peritoneum time as 120.92 minutes in Group A and 112.54 minutes in Group B. All of them were not statistically significant.

TABLE 12 - COMPARISON OF NAUSEA, RETCHING, VOMITING AND NEED FOR RESCUE MEDICATION AFTER 2HRS OF SURGERY IN ONDANSETRON GROUP

ONDANSETRON GROUP	NAUSEA	RETCHING	VOMITING	RESCUE MEDICATION
Yes	3[6%]	2 [4%]	2 [4%]	2 [4%]
No	47 [94%]	48 [96%]	48 [96%]	48 [96%]
Total	50	50	50	50

FIGURE 15 - COMPARISON OF NAUSEA, RETCHING, VOMITING AND NEED FOR RESCUE MEDICATION AFTER 2 HRS OF SURGERY IN ONDANSETRON GROUP

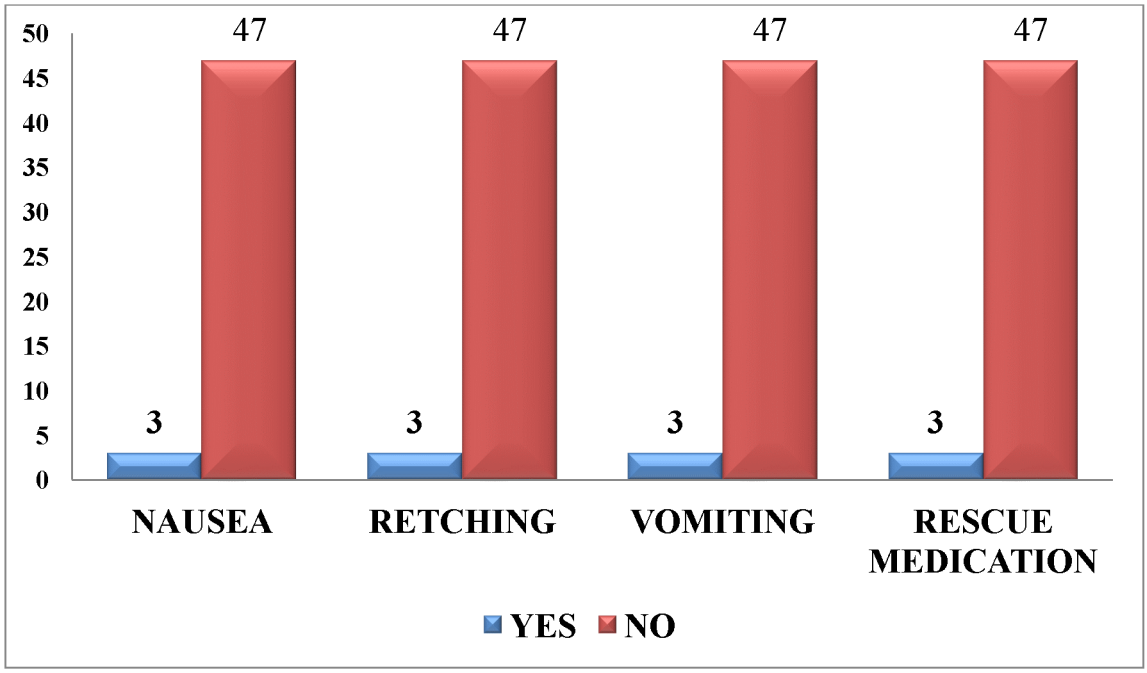


The table 12 and figure 15 shows the comparison of nausea, retching, vomiting and rescue medication usage 2 hrs of post surgery. 94% among Group A did not have nausea and 96% of them did not have retching, vomiting with negligible requirement of rescue medication.

TABLE 13 - COMPARISON OF NAUSEA, RETCHING, VOMITING AND NEED FOR RESCUE MEDICATION AT 2 – 6 HRS POST SURGERY IN ONDANSETRON GROUP

ONDANSETRON GROUP	NAUSEA	RETCHING	VOMITING	RESCUE MEDICATION
Yes	3 [6%]	3 [6%]	3 [6%]	3 [6%]
No	47 [94%]	47 [94%]	47 [94%]	47 [94%]
Total	50	50	50	50

FIGURE 16 - COMPARISON OF PARAMETRES AT 2 - 6 HRS AFTER SURGERY IN ONDANSETRON GROUP

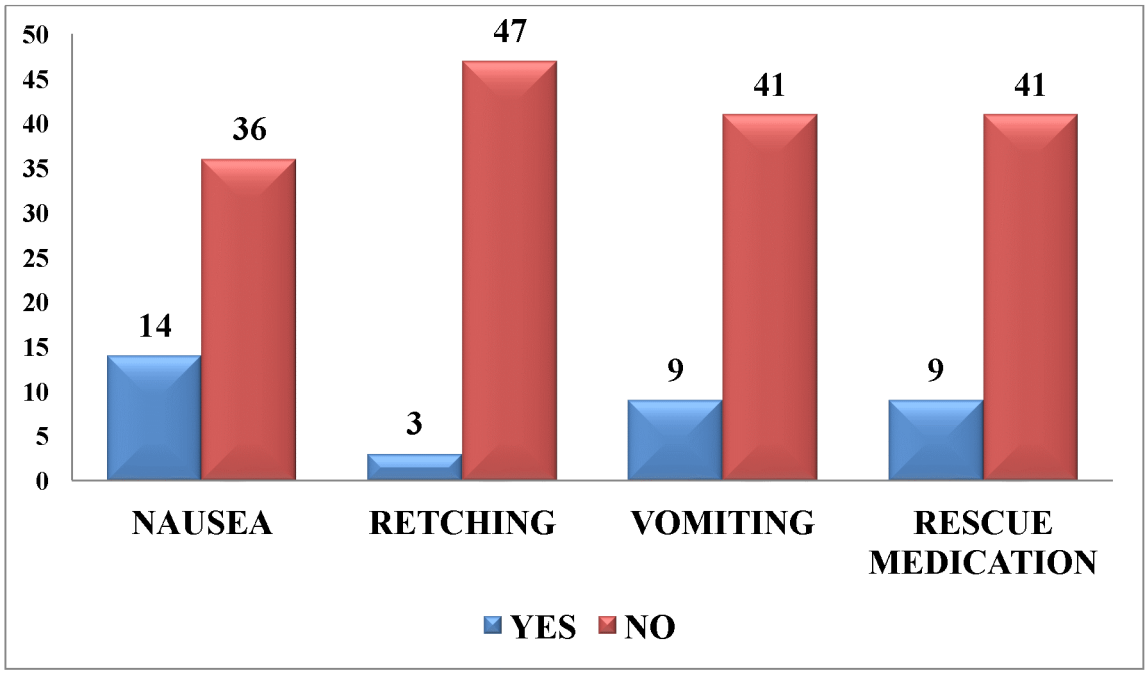


The table 13 and figure 16 shows the comparison of nausea, retching, vomiting and rescue medication use at 2 – 6 hrs post surgery. 94% of them did not have nausea retching, vomiting and did not require rescue medication during this period.

TABLE 14 - COMPARISON OF NAUSEA, RETCHING, VOMITING AND NEED FOR RESCUE MEDICATION AT 6 – 24 HRS POST SURGERY IN ONDANSETRON GROUP

ONDANSETRON GROUP	NAUSEA	RETCHING	VOMITING	RESCUE MEDICATION
Yes	14 [28%]	3 [6%]	9 [18%]	9 [18%]
No	36 [72%]	47 [94%]	41 [82%]	41 [82%]
Total	50	50	50	50

FIGURE 17 - COMPARISON OF PARAMETRES AT 6 - 24 HRS AFTER SURGERY IN ONDANSETRON GROUP

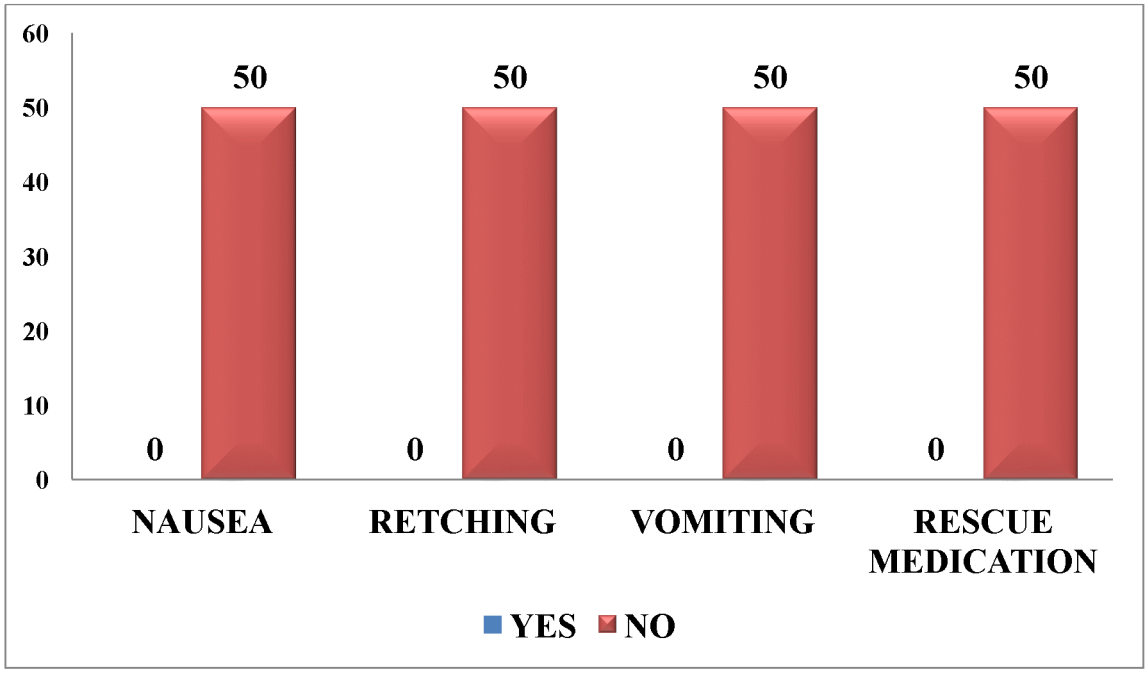


The table 14 and figure 17 shows the comparison of nausea, retching, vomiting and rescue medication use at 6 – 24 hrs post surgery. From our study, there was no nausea in 72%, no retching in 94%, no vomiting and requirement of rescue medication in 82% patients in Ondansetron group.

Table 15 - COMPARISON OF NAUSEA, RETCHING, VOMITING AND NEED FOR RESCUE MEDICATION AFTER 2HRS OF SURGERY IN PALONOSETRON GROUP

	NAUSEA	RETCHING	VOMITING	RESCUE MEDICATION
Yes	0	0	0	0
No	50 [100%]	50 [100%]	50 [100%]	50 [100%]
Total	50	50	50	50

FIGURE 18 - COMPARISON OF PARAMETRES AFTER 2 S OF SURGERY IN PALONOSETRON GROUP

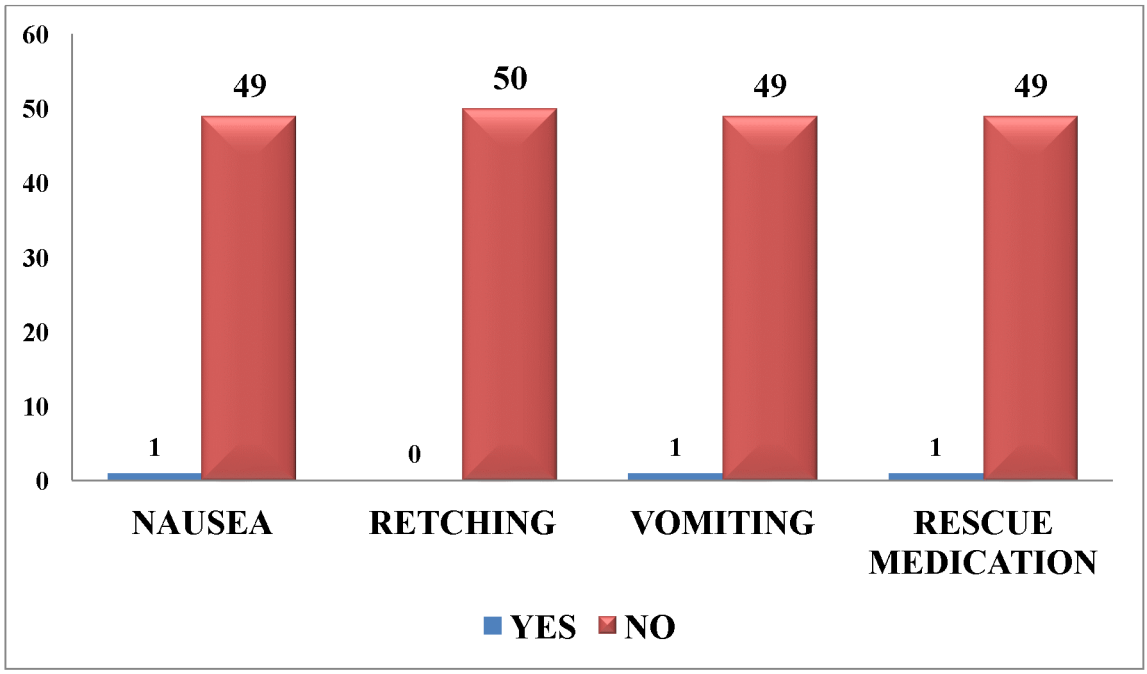


The table 15 and figure 18 shows the comparison of nausea, retching, vomiting and rescue medication use after 2 hrs of surgery. None of the patients in Ondansetron group had nausea, retching, vomiting and did not require rescue medication after 2 hours of surgery.

TABLE 16 - COMPARISON OF NAUSEA, RETCHING, VOMITING AND NEED FOR RESCUE MEDICATION AT 2 – 6 HRS POST SURGERY IN PALONOSETRON GROUP

	NAUSEA	RETCHING	VOMITING	RESCUE MEDICATION
Yes	1 [2%]	0	1 [2%]	1 [2%]
No	49 [98%]	50 [100%]	49 [98%]	49 [98%]
Total	50	50	50	50

FIGURE 19 - COMPARISON OF PARAMETRES AT 2 - 6 HRS AFTER SURGERY IN PALONOSETRON GROUP

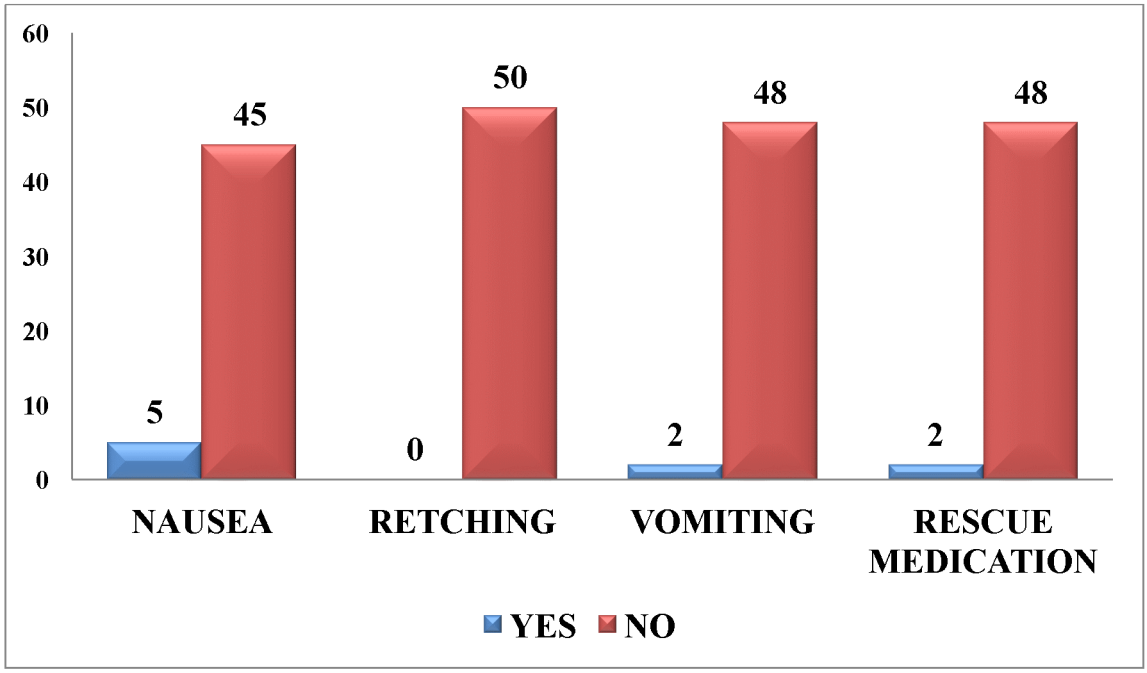


The table 16 and figure 19 shows the comparison of nausea, retching, vomiting and rescue medication use at 2 – 6 hrs post surgery. 98% of them did not have nausea, vomiting and did not require rescue medication during this period.

Table 17 - COMPARISON OF NAUSEA, RETCHING, VOMITING AND NEED FOR RESCUE MEDICATION AT 6 – 24 HRS POST SURGERY IN PALONOSETRON GROUP

	NAUSEA	RETCHING	VOMITING	RESCUE MEDICATION
Yes	5 [10%]	0	2 [4%]	2 [4%]
No	45 [90%]	50[100%]	48 [96%]	48 [96%]
Total	50	50	50	50

FIGURE 20 - COMPARISON OF PARAMETRES AT 6 - 24 HRS AFTER SURGERY IN PALONOSETRON GROUP

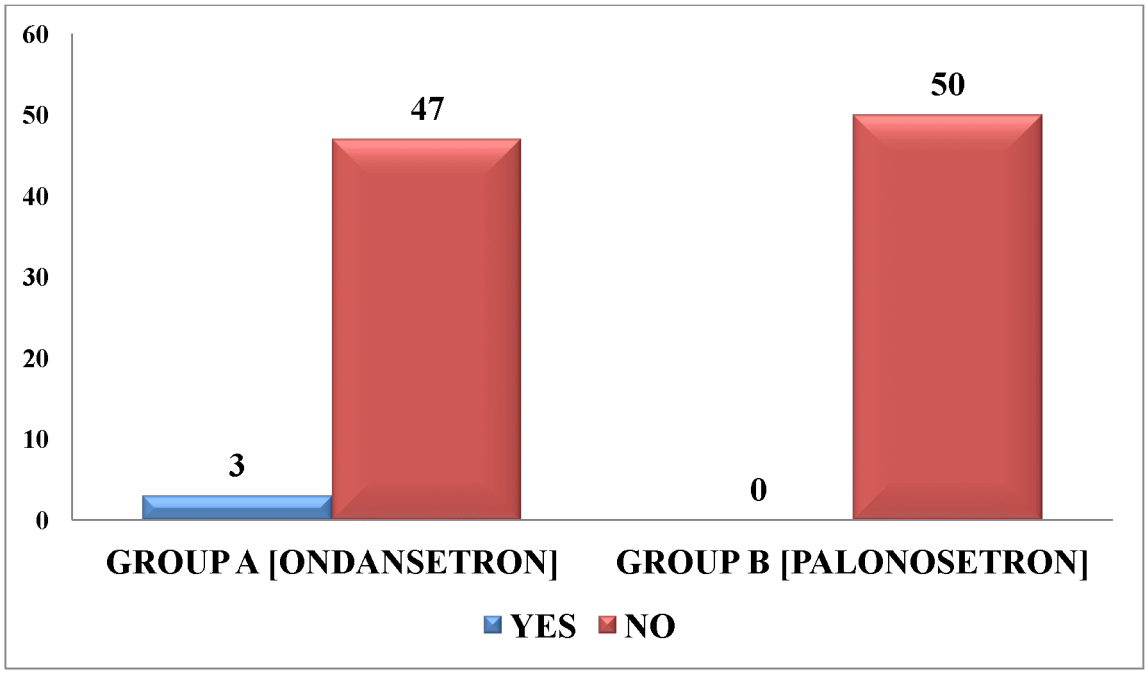


The table 17 and figure 20 shows the comparison of nausea, retching, vomiting and rescue medication use at 6 – 24 hrs post surgery. 90% of them did not have nausea, 96% of them did not have vomiting and did not require rescue medication during this period.

TABLE 18 - COMPARISON OF INCIDENCE OF NAUSEA AFTER 2 HRS OF SURGERY

NAUSEA	GROUP A ONDANSETRON		GROUP B PALONOSETRON	
	No. of Patients	Percentage	No. of Patients	Percentage
Yes	3	6	0	0
No	47	94	50	100
Total	50	100	50	100
χ^2	3.093			
p VALUE	0.079			

FIGURE 21 - NAUSEA BETWEEN THE GROUPS AFTER 2 HRS OF SURGERY

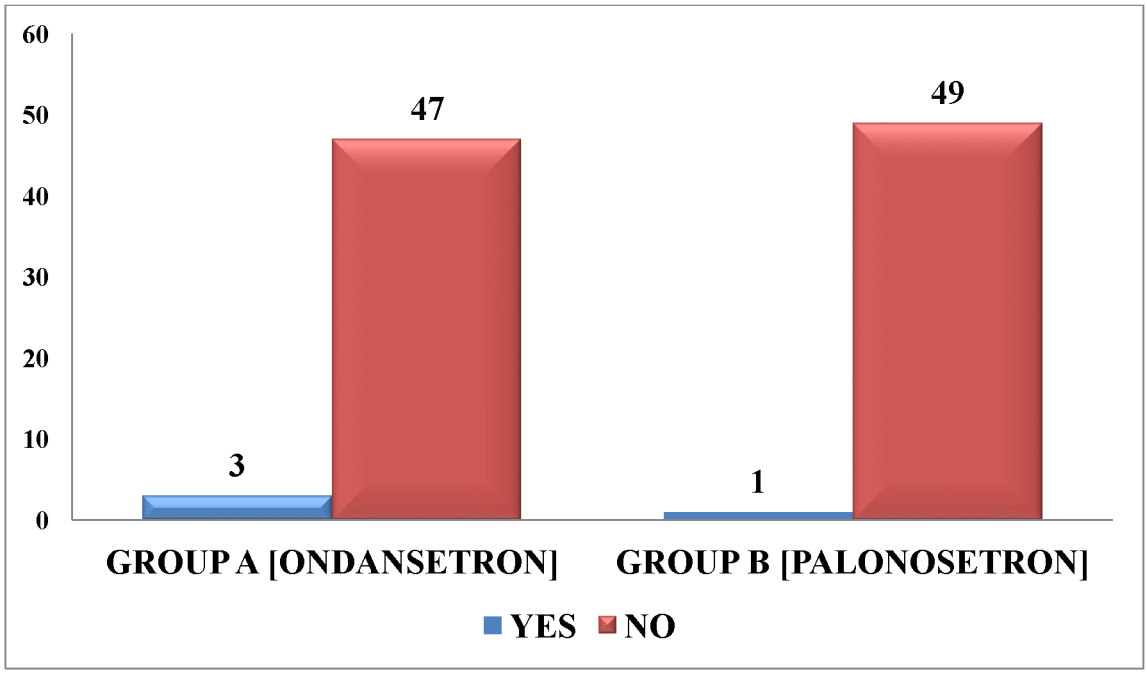


The table 18 and figure 21 shows that 94% in Ondansetron group did not have nausea at 2nd post operative hour where as there was no incidence of nausea in Palonosetron group. The p value 0.079 signifies statistical insignificance.

TABLE 19 - COMPARISON OF INCIDENCE OF NAUSEA AT 2 – 6 HRS POST SURGERY

NAUSEA	GROUP A ONDANSETRON		GROUP B PALONOSETRON	
	No. of Patients	Percentage	No. of Patients	Percentage
Yes	3	6	1	2
No	47	94	49	98
Total	50	100	50	100
χ^2	1.042			
p VALUE	0.307			

FIGURE 22 - NAUSEA BETWEEN THE GROUPS AT 2 - 6 HRS POST SURGERY

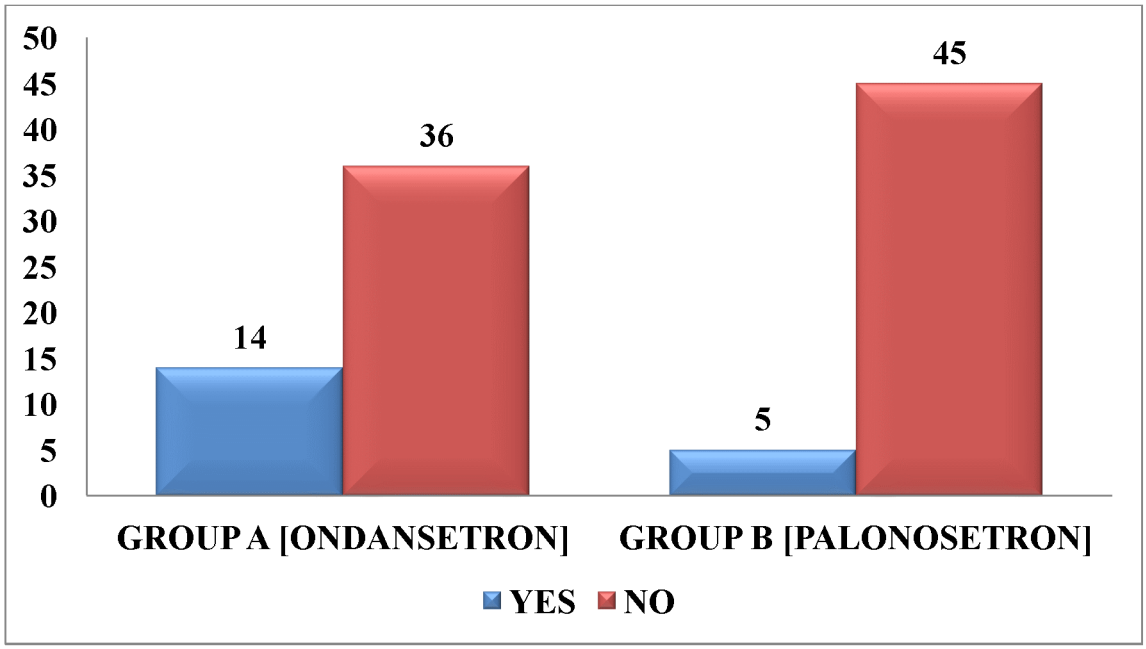


The table 19 and figure 22 shows that 94% did not have nausea during first 6 hrs after the procedure in Ondansetron group where as 98% of them did not have nausea in Palonosetron group. The p value is 0.307 [Not Significant].

TABLE 20 - COMPARISON OF INCIDENCE OF NAUSEA AT 6 – 24 HRS POST SURGERY

NAUSEA	GROUP A ONDANSETRON		GROUP B PALONOSETRON	
	No. of Patients	Percentage	No. of Patients	Percentage
Yes	14	28	5	10
No	36	72	45	90
Total	50	100	50	100
χ^2	5.263			
p VALUE	0.022			

FIGURE 23 - NAUSEA BETWEEN THE GROUPS AT 6 - 24 HRS POST SURGERY

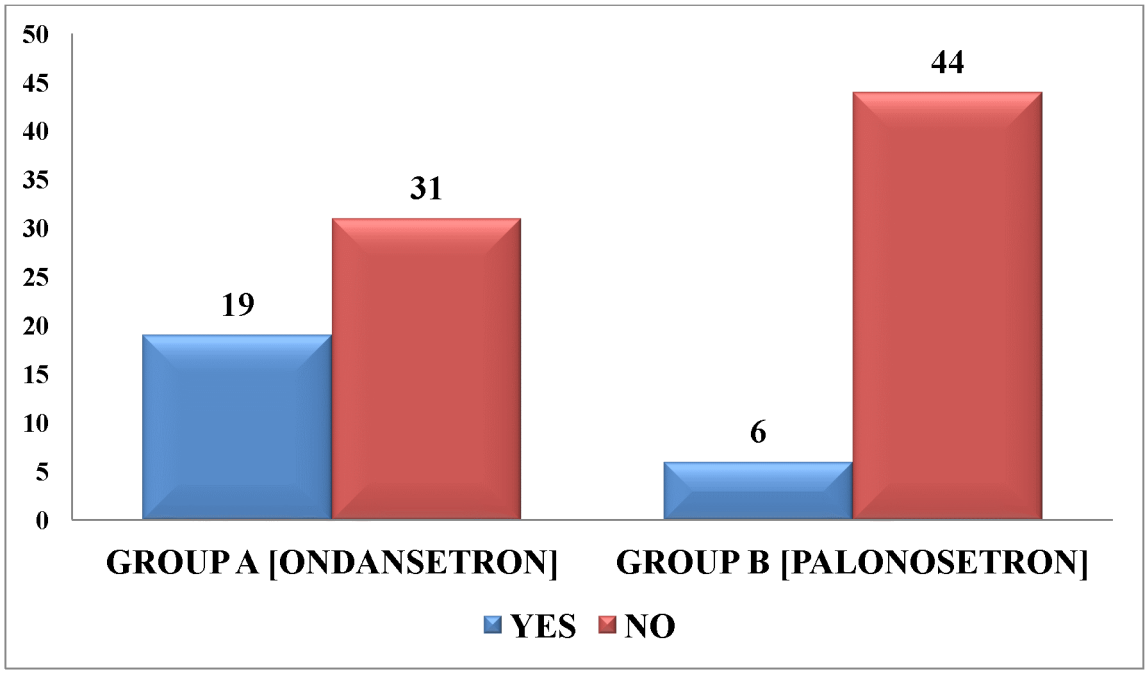


The table 20 and figure 23 shows that 72% of them did not have nausea during 6 – 24 hrs after the procedure in Ondansetron group where as 90% of them did not have nausea in Palonosetron group. The p value is statistically significant.

TABLE 21 - COMPARISON OF INCIDENCE OF NAUSEA IN 1ST 24 HRS POST SURGERY

NAUSEA	GROUP A ONDANSETRON		GROUP B PALONOSETRON	
	No. of Patients	Percentage	No. of Patients	Percentage
Yes	19	38	06	12
No	31	62	44	88
Total	50	100	50	100
χ^2	9.013			
p VALUE	0.003			

FIGURE 24 - COMPARISON OF NAUSEA IN FIRST 24 HRS POST SURGERY



The table 21 and figure 24 shows that 62% of them did not have nausea in first 24 hrs post procedure in Ondansetron group where as 88% of them did not have nausea in Palonosetron group. The p value is 0.003[Significant].

TABLE 22 - COMPARISON OF INCIDENCE OF NAUSEA AT 2 HRS, 6HRS & 24HRS POST SURGERY

TIME INTERVAL AFTER SURGERY	GROUP A ONDANSETRON		GROUP B PALONOSETRON		χ^2	p VALUE
	Yes	No	Yes	No		
2 hrs	3 [6%]	47 [94%]	0	50 [100%]	3.093	0.079 [NS]
6 hrs	3 [6%]	47 [94%]	1 [2%]	49 [98%]	1.042	0.307 [NS]
24 hrs	14 [28%]	36 [72%]	5 [10%]	45 [90%]	5.263	**0.022 [SIG]**

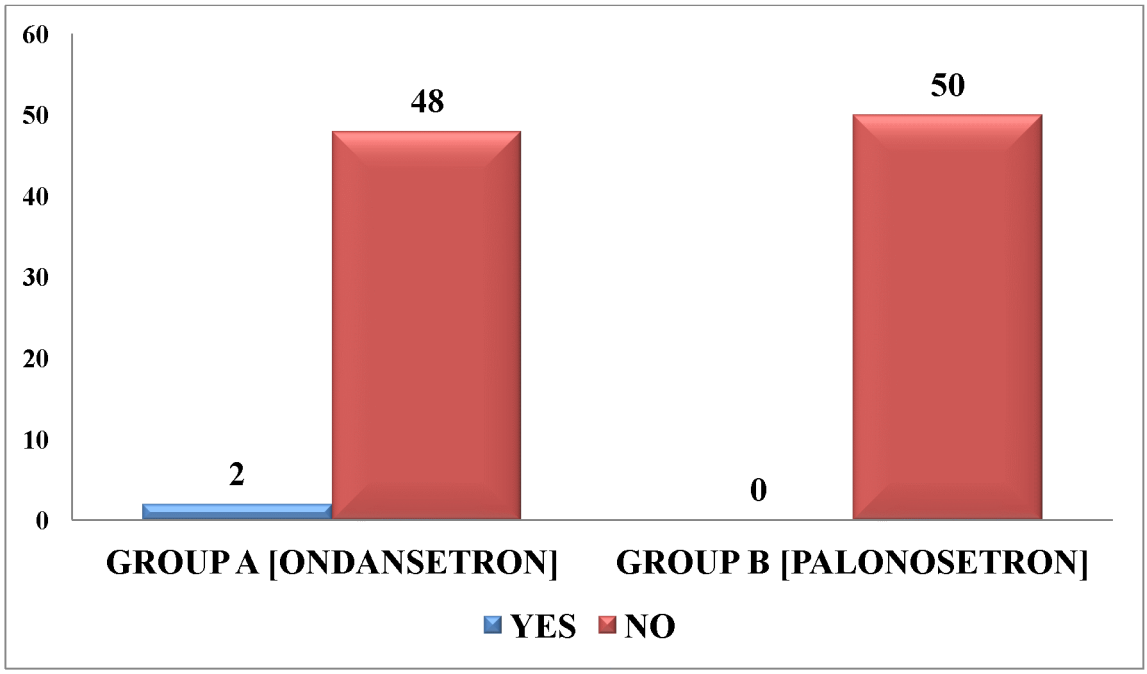
NS – NOT SIGNIFICANT SIG - SIGNIFICANT

The table shows that incidence of nausea at 2hrs, 6hrs and 24hrs post operative period. In 2nd hour 100 % of the patients in both groups did not have nausea. In 6th and 24th hours post procedure, Palonosetron group had better response than Ondansetron group. The p value is less than 0.05 at 24hrs post operative period which is statistically significant where as the p Value is more than 0.05 in 2nd and 6th hour post procedure.

TABLE 23 - COMPARISON OF INCIDENCE OF RETCHING IN BOTH GROUPS AFTER 2 HRS OF SURGERY

RETCHING	GROUP A ONDANSETRON		GROUP B PALONOSETRON	
	No. of Patients	Percentage	No. of Patients	Percentage
Yes	2	4	0	0
No	48	96	50	100
Total	50	100	50	100
χ^2	2.041			
p VALUE	0.153			

FIGURE 25 - DISTRIBUTION OF RETCHING BETWEEN THE GROUPS AFTER 2 HRS OF SURGERY

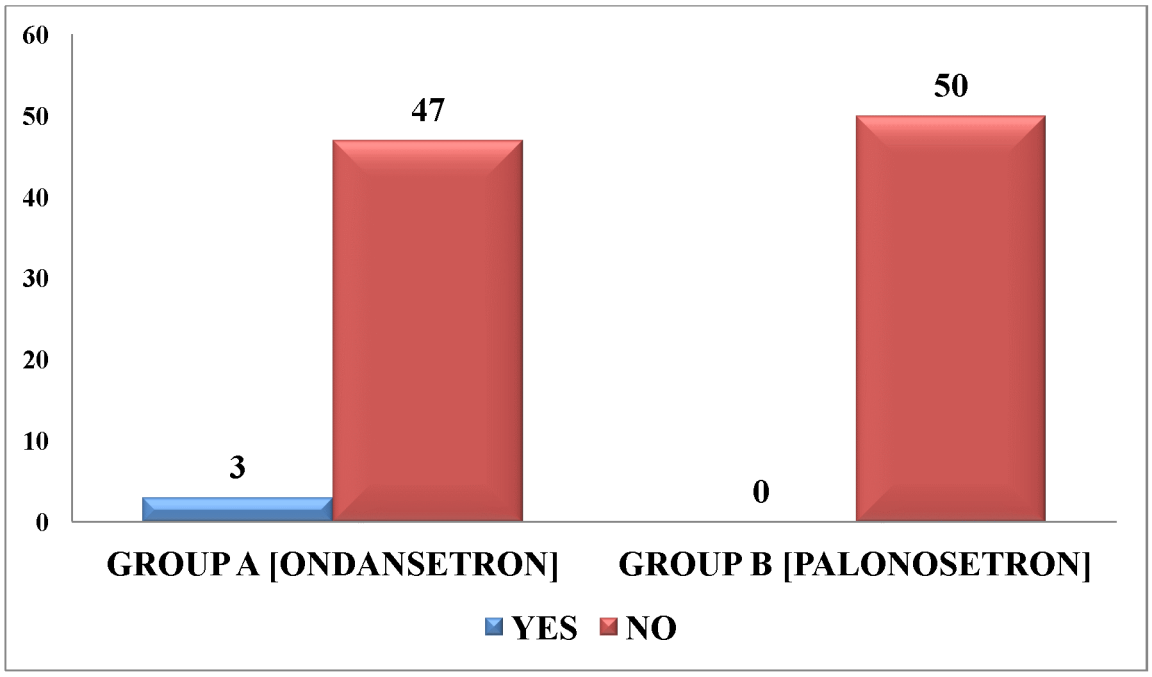


The table 23 and figure 25 shows that 48 of 50 patients did not have retching at 2nd post operative hour in Ondansetron group where as in Palonosetron none of the patients had retching. The p value is 0.153 [Not Significant].

TABLE 24 - COMPARISON OF INCIDENCE OF RETCHING IN BOTH GROUPS AT 2 – 6 HRS POST SURGERY

RETCHING	GROUP A ONDANSETRON		GROUP B PALONOSETRON	
	No. of Patients	Percentage	No. of Patients	Percentage
Yes	3	6	0	0
No	47	94	50	100
Total	50	100	50	100
χ^2	3.093			
p VALUE	0.079 [Not significant]			

FIGURE 26 - RETCHING BETWEEN THE GROUPS AT 2 - 6 HRS POST SURGERY

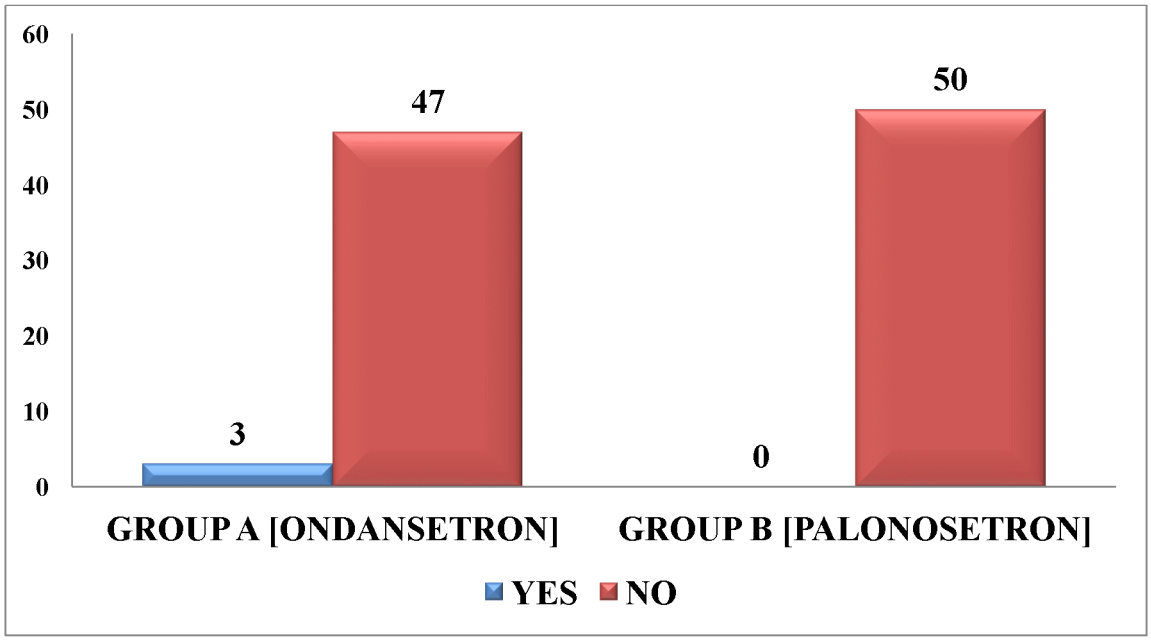


The table 24 and figure 26 shows the incidence of retching between both groups. 94% in Ondansetron group did not have retching during first 6 hrs after the procedure in Ondansetron group where as none of them had retching in Palonosetron group. The p value is 0.079 [Not Significant].

TABLE 25 - COMPARISON OF INCIDENCE OF RETCHING IN BOTH GROUPS AT 6 – 24 HRS POST SURGERY

RETCHING	GROUP A ONDANSETRON		GROUP B PALONOSETRON	
	No. of Patients	Percentage	No. of Patients	Percentage
Yes	3	6	0	0
No	47	94	50	100
Total	50	100	50	100
χ^2	3.093			
p VALUE	0.079			

FIGURE 27 – RETCHING BETWEEN THE GROUPS AT 6 - 24 HRS POST SURGERY

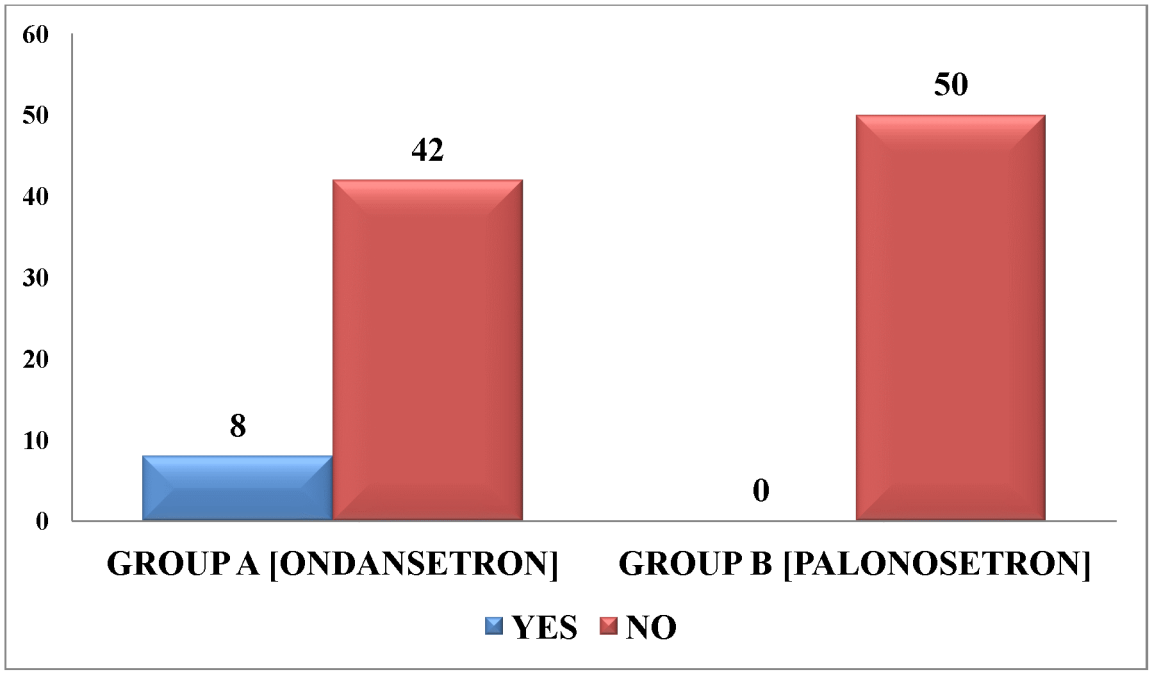


The table 25 and figure 27 shows the incidence of retching. 94% of them did not have retching during 6 – 24 hrs after the procedure in Ondansetron group where as 100% of them did not have retching in Palonosetron group. The p value is 0.079 [Not Significant].

TABLE 26 - COMPARISON OF RETCHING IN FIRST 24 HRS POST SURGERY

RETCHING	GROUP A ONDANSETRON		GROUP B PALONOSETRON	
Yes	8	16	0	0
No	42	84	50	100
Total	50	100	50	100
χ^2	8.696			
p VALUE	**0.003**			

FIGURE 28 - COMPARISON OF RETCHING IN FIRST 24 HRS POST SURGERY



The table 26 and figure 28 shows that 84% of them did not have retching in first 24 hrs post procedure in Ondansetron group where as 100% of them did not have retching in Palonosetron group. The p value is 0.003[Significant].

TABLE 27 - COMPARISON OF INCIDENCE OF RETCHING AT 2 HRS, 6HRS & 24HRS POST SURGERY

TIME INTERVAL AFTER SURGERY	GROUP A ONDANSETRON		GROUP B PALONOSETRON		χ^2	p VALUE
	Yes	No	Yes	No		
2 hrs	2 [4%]	48 [96%]	0	50 [100%]	2.041	0.153 [NS]
6 hrs	3 [6%]	47 [94%]	0	50 [100%]	3.093	0.079 [NS]
24 hrs	3 [6%]	47 [94%]	0	50 [100%]	3.093	0.079 [NS]

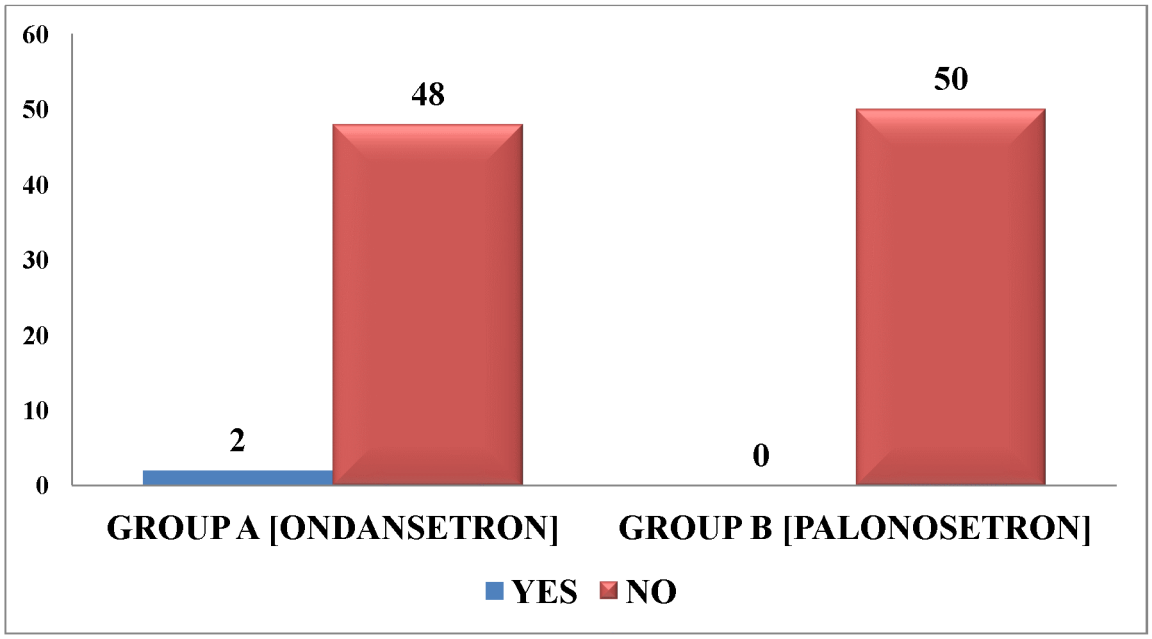
NS – NOT SIGNIFICANT

The table 24 shows that incidence of retching at 2hrs, 6hrs and 24hrs post operative period. 96% in Ondansetron group and 100% Palonosetron group respectively did not have nausea during 2nd hour post surgery. In 6th and 24th hours post procedure Palonosetron group had better response than Ondansetron group. The p value is not less than 0.05 at 2nd, 6th and 24hrs post operative period which is statistically not significant.

TABLE 28 - COMPARISON OF INCIDENCE OF VOMITING AT 2 HRS POST SURGERY

VOMITING	GROUP A ONDANSETRON		GROUP B PALONOSETRON	
	No. of Patients	Percentage	No. of Patients	Percentage
Yes	2	4	0	0
No	48	96	50	100
Total	50	100	50	100
χ^2	2.041			
p VALUE	0.153			

FIGURE 29 - VOMITING BETWEEN THE GROUPS AT 2 HRS POST SURGERY

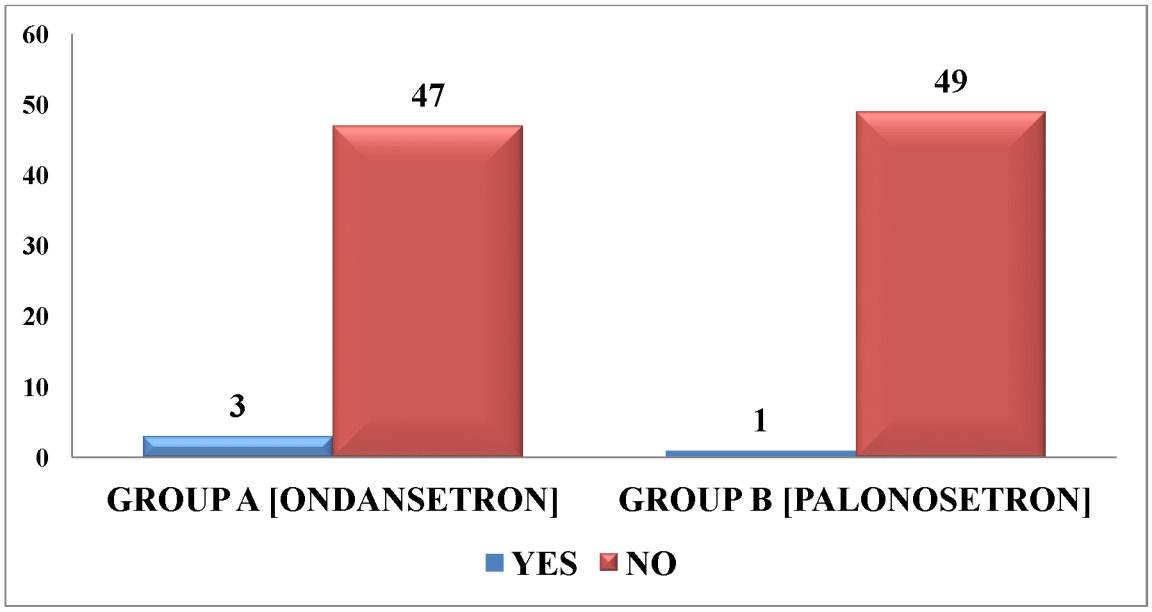


The table 28 and figure 29 shows that 96% of them did not have vomiting during first 2 hrs after the procedure in Ondansetron group where as 100% of them did not have vomiting in Palonosetron group. The p value is 0.153 [Not Significant].

TABLE 29 - COMPARISON OF INCIDENCE OF VOMITING AT 2 – 6 HRS POST SURGERY

VOMITING	GROUP A ONDANSETRON		GROUP B PALONOSETRON	
	No. of Patients	Percentage	No. of Patients	Percentage
Yes	3	6	1	2
No	47	94	49	98
Total	50	100	50	100
χ^2	1.042			
p VALUE	0.307			

FIGURE 30 - VOMITING BETWEEN THE GROUPS AT 2 - 6 HRS POST SURGERY

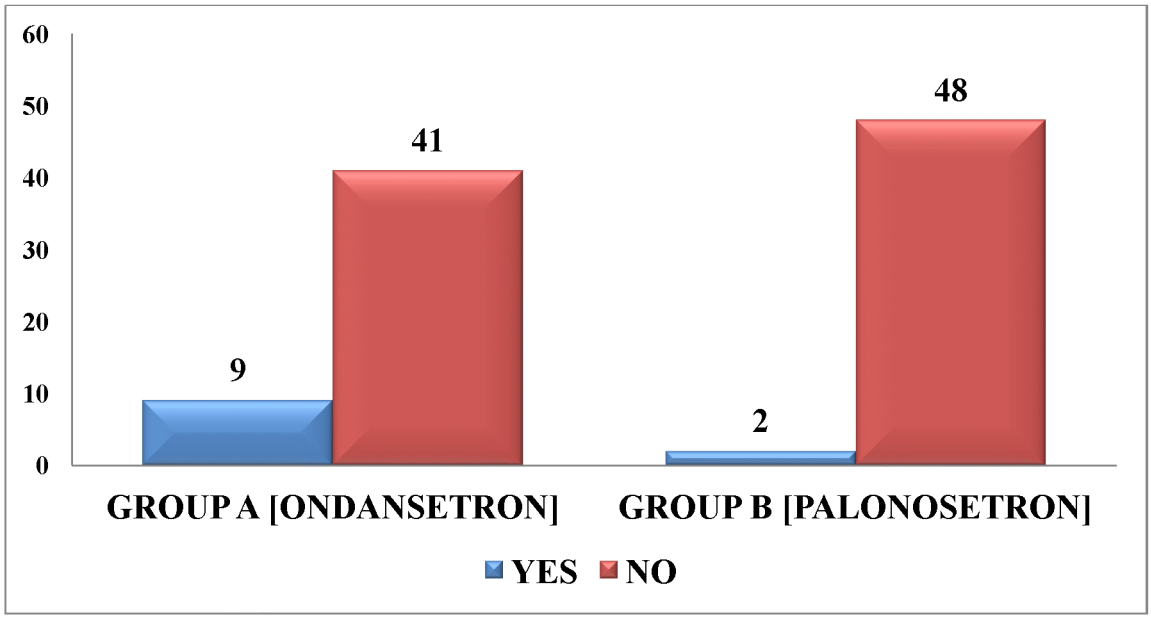


The table 29 and figure 30 shows the incidence of vomiting. 94% of them did not have vomiting during first 6 hrs after the procedure in Ondansetron group where as 98% of them did not have vomiting in Palonosetron group. The p value is 0.307 [Not Significant].

TABLE 30 - COMPARISON OF INCIDENCE OF VOMITING AT 6 – 24 HRS POST SURGERY

VOMITING	GROUP A ONDANSETRON		GROUP B PALONOSETRON	
	No. of Patients	Percentage	No. of Patients	Percentage
Yes	9	18	2	4
No	41	82	48	96
Total	50	100	50	100
χ^2	5.005			
p VALUE	0.025			

FIGURE 31 - VOMITING BETWEEN THE GROUPS AT 6 - 24 HRS POST SURGERY

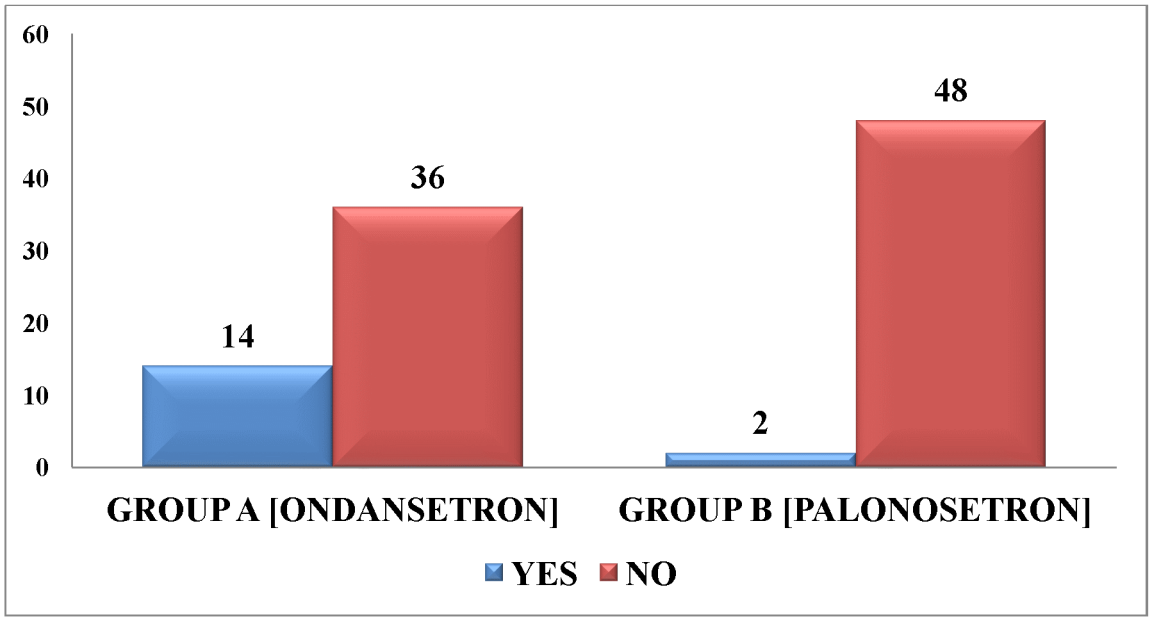


The table 30 and figure 31 shows that 82% of them did not have vomiting during 6 – 24 hrs after the procedure in Ondansetron group where as 96% of them did not have vomiting in Palonosetron group. The p value is 0.025. [Significant]

TABLE 31 - COMPARISON OF INCIDENCE OF VOMITING IN FIRST 24 HRS POST SURGERY

VOMITING	GROUP A ONDANSETRON		GROUP B PALONOSETRON	
	No. of Patients	Percentage	No. of Patients	Percentage
Yes	14	28	02	4
No	36	72	48	96
Total	50	100	50	100
χ^2	10.714			
p VALUE	0.001			

FIGURE 32 - COMPARISON OF VOMITING IN FIRST 24 HRS POST SURGERY



The table 31 and figure 32 shows the incidence of vomiting. 72% of them did not have vomiting in first 24 hrs post procedure in Ondansetron group where as 96% of them did not have vomiting in Palonosetron group. The p value is 0.001 [Significant].

TABLE 32 - COMPARISON OF INCIDENCE OF VOMITING AT 2 HRS, 6HRS & 24HRS POST SURGERY

TIME INTERVAL AFTER SURGERY	GROUP A ONDANSETRON		GROUP B PALONOSETRON		χ^2	p VALUE
	Yes	No	Yes	No		
2 hrs	2 [4%]	48 [96%]	0	50 [100%]	2.041	0.153 [NS]
6 hrs	3 [6%]	47 [94%]	1 [2%]	49 [98%]	1.042	0.307 [NS]
24 hrs	9 [18%]	41 [82%]	2 [4%]	48 [96%]	5.005	**0.025 [SIG]**

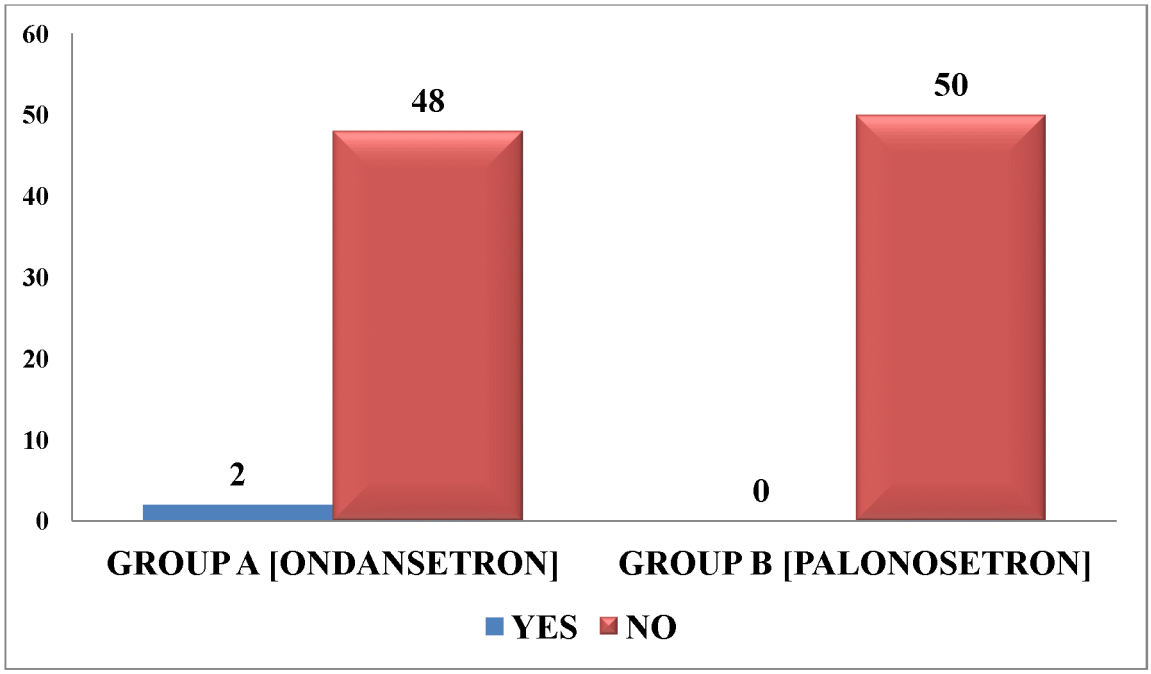
NS – NOT SIGNIFICANT SIG - SIGNIFICANT

The table shows that incidence of vomiting at 2hrs, 6hrs and 24hrs post operative period. In 2nd hour, 96% in Ondansetron group and 100 % in Palonosetron group did not have vomiting. In 6th and 24th hours post procedure Palonosetron group had better response than Ondansetron group. The p value is less than 0.05 at 24hrs post operative period which is statistically significant where as the p value is more than 0.05 in 2nd and 6th hour post procedure.

TABLE 33 - COMPARISON OF INCIDENCE OF NEED FOR RESCUE MEDICATION AT 2 HRS POST SURGERY

RESCUE MEDICATION	GROUP A ONDANSETRON		GROUP B PALONOSETRON	
	No. of Patients	Percentage	No. of Patients	Percentage
Yes	2	4	0	0
No	48	96	50	100
Total	50	100	50	100
χ^2	2.041			
p VALUE	0.153			

FIGURE 33 - NEED FOR RESCUE MEDICATION BETWEEN THE GROUPS AT 2 HRS POST SURGERY

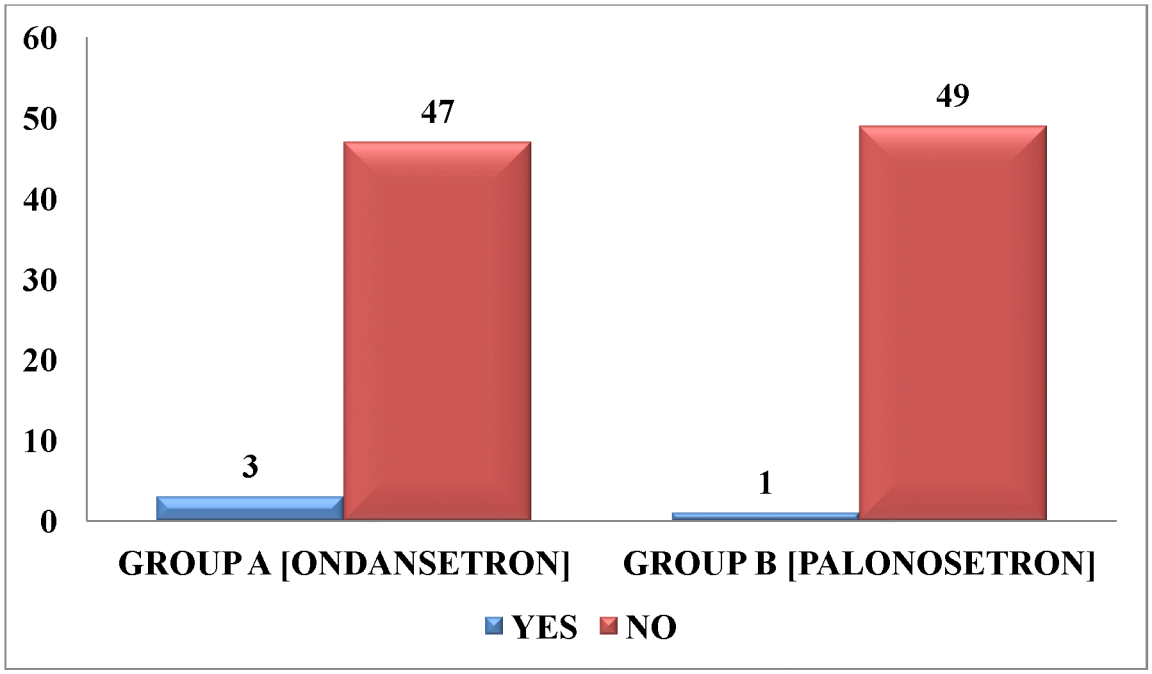


The table 33 and figure 33 shows that 96% of them did not require rescue medication during first 2 hrs after the procedure in Ondansetron group where as 100% of them did not require rescue medication in Palonosetron group. The p value is 0.153 [Not Significant].

TABLE 34 - COMPARISON OF NEED FOR RESCUE MEDICATION AT 2 – 6 HRS POST SURGERY

RESCUE MEDICATION	GROUP A ONDANSETRON		GROUP B PALONOSETRON	
	No. of Patients	Percentage	No. of Patients	Percentage
Yes	3	6	1	2
No	47	94	49	98
Total	50	100	50	100
χ^2	1.042			
p VALUE	0.307			

FIGURE 34 - NEED FOR RESCUE MEDICATION BETWEEN THE GROUPS AT 2 - 6 HRS POST SURGERY

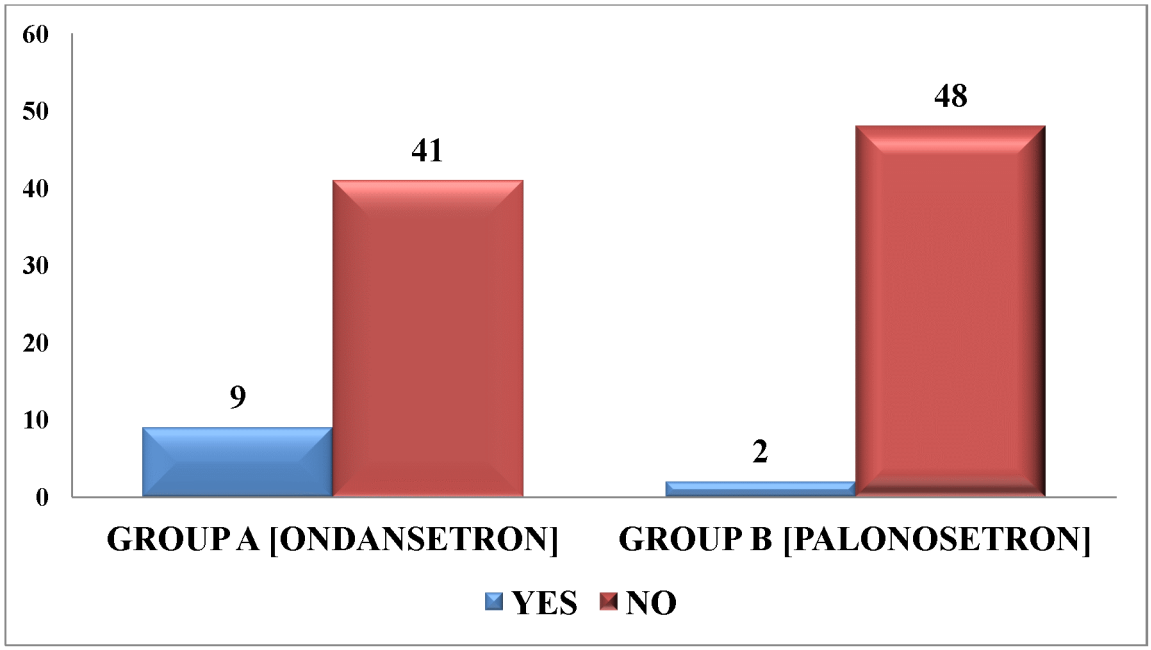


The table 34 and figure 34 shows that 94% of them did not require rescue medication during first 6 hrs after the procedure in Ondansetron group where as 98% of them did not require rescue medication in Palonosetron group. The p value is 0.307 [Not Significant].

TABLE 35 - COMPARISON OF NEED FOR RESCUE MEDICATION AT 6 – 24 HRS POST SURGERY

RESCUE MEDICATION	GROUP A ONDANSETRON		GROUP B PALONOSETRON	
	No. of Patients	Percentage	No. of Patients	Percentage
Yes	9	18	2	4
No	41	82	48	96
Total	50	100	50	100
χ^2	5.005			
p VALUE	0.025			

FIGURE 35 - NEED FOR RESCUE MEDICATION BETWEEN THE GROUPS AT 6 - 24 HRS POST SURGERY

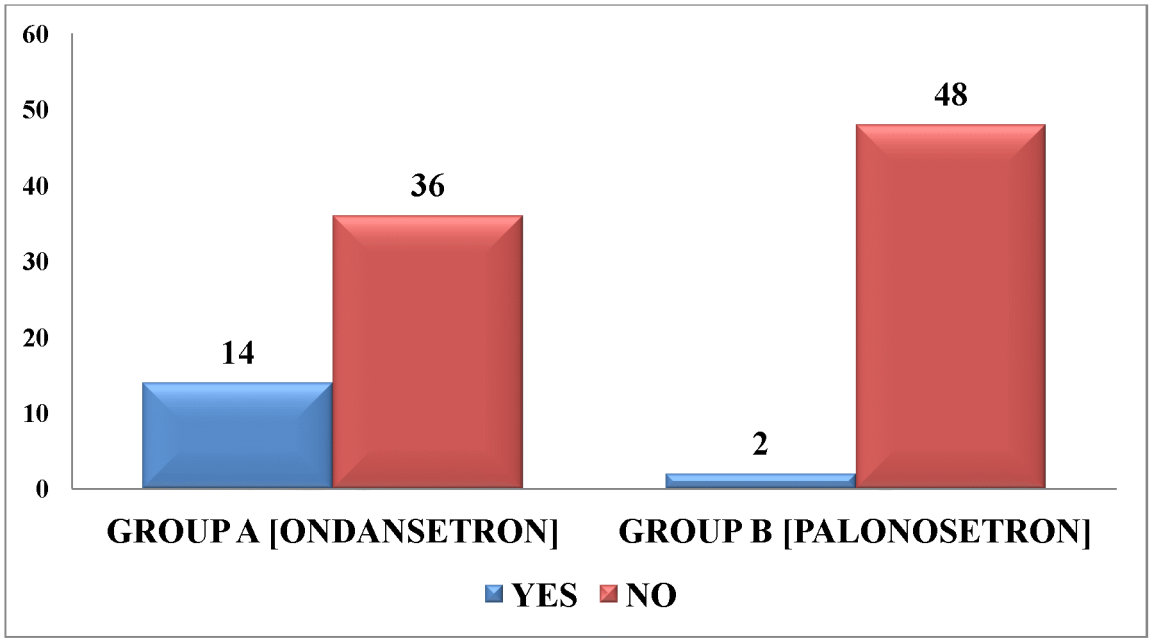


The table 35 and figure 35 shows that 82% of them did not require rescue medication during 6 – 24 hrs after the procedure in Ondansetron group where as 96% of them did not require rescue medication in Palonosetron group. The p value is 0.025[Significant].

TABLE 36 - COMPARISON OF NEED FOR RESCUE MEDICATION IN 1ST 24 HRS POST SURGERY

RESCUE MEDICATION	GROUP A ONDANSETRON		GROUP B PALONOSETRON	
	No. of Patients	Percentage	No. of Patients	Percentage
Yes	14	28	02	4
No	36	72	48	96
Total	50	100	50	100
χ^2	10.714			
p VALUE	0.001			

FIGURE 36 - NEED FOR RESCUE MEDICATION BETWEEN THE GROUPS AT 1ST 24 HRS POST SURGERY



The table 36 and figure 36 shows that 72% of them did not require rescue medication in first 24 hrs post procedure in Ondansetron group where as 96% of them did not require rescue medication in Palonosetron group. The p value is 0.001 [Significant].

TABLE 37 - COMPARISON OF NEED FOR RESCUE MEDICATION AT 2 HRS, 6HRS & 24HRS POST SURGERY

Time interval after surgery	GROUP A ONDANSETRON		GROUP B PALONOSETRON		χ^2	p Value
	Yes	No	Yes	No		
2 hrs	2 [4%]	48 [96%]	0	50 [100%]	2.041	0.153 [NS]
6 hrs	3 [6%]	47 [94%]	1 [2%]	49 [98%]	1.042	0.307 [NS]
24 hrs	9 [18%]	41 [82%]	2 [4%]	48 [96%]	5.005	**0.025 [SIG]**

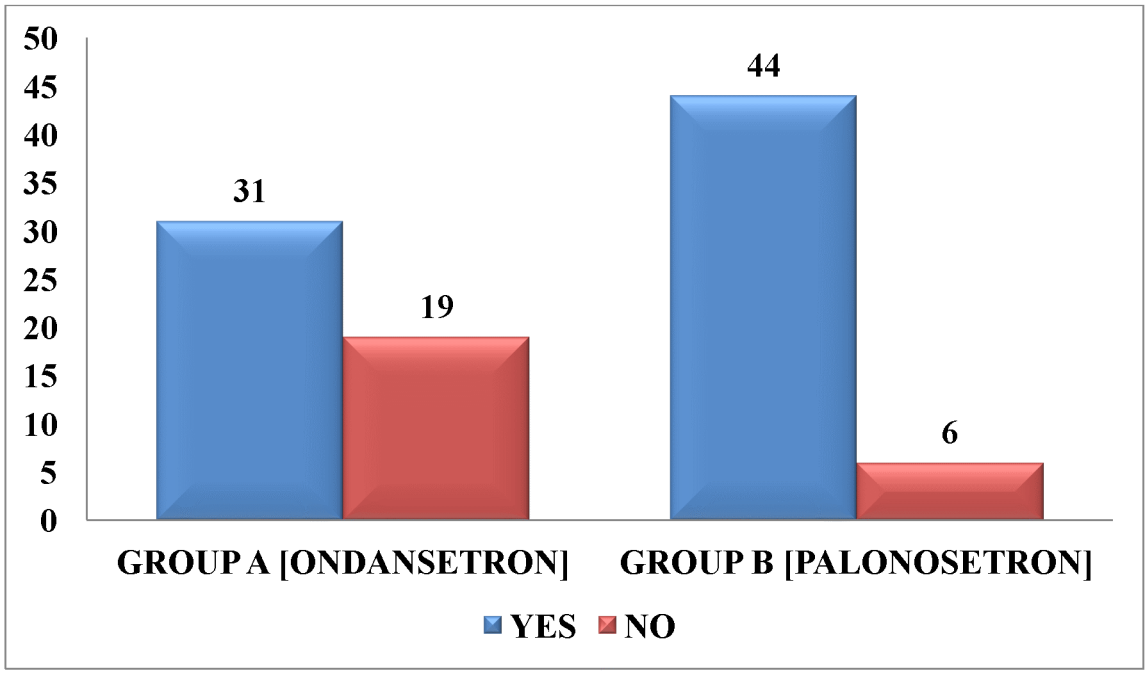
NS – NOT SIGNIFICANT SIG - SIGNIFICANT

The table shows that incidence of need for rescue medication at 2hrs, 6hrs and 24hrs post operative period. In 2nd hour, 96% in Ondansetron group and 100 % in Palonosetron group did not require rescue medication. In 6th and 24th hours post procedure Palonosetron group had better response than Ondansetron group. The p value is less than 0.05 at 24hrs post operative period which is statistically significant where as the p value is more than 0.05 in 2nd and 6th hour post procedure.

TABLE 38 - DISTRIBUTION OF COMPLETE RESPONDERS BETWEEN TWO GROUPS

	Complete Responders		χ^2	p Value
	Yes	No		
GROUP A ONDANSETRON	31 [62%]	19 [38%]	9.013	**0.003**
GROUP B PALONOSETRON	44 [88%]	6 [12%]		

FIGURE 37 - DISTRIBUTION OF COMPLETE RESPONDERS



The table 38 and figure 37 shows complete responders between the groups. 62% in Ondansetron group and 88% in Palonosetron group showed complete responders. They are statistically significant.

DISCUSSION

6. DISCUSSION

In the present day to day practice, PONV still remains a big challenge for the surgeons and anesthesiologists. This discomfort makes the patient to grade this effect as equal to pain in post operative period[56, 57].

Incidence of post operative nausea and vomiting is multi factorial which could be patient related factors, anaesthesia dependent factors and surgery related factors. Hence it is difficult to predict the outcome of PONV. Though there are various regimens to control PONV, the incidence still remains high.

The present study is carried out to see the efficacy of the new second generation $5HT_3$ receptor antagonist with longer half life [Palonosetron] with Ondansetron in the management of post operative nausea and vomiting among patients undergoing laparoscopic cholecystectomy under general anaesthesia.

100 patients were included in our study and divided into two groups comprising of 50 patients in each group based on computer generated random numbers.

Studies and guidelines show that Inj. Ondansetron 4mg is effective for prevention of post operative nausea and vomiting[54]. In this study also we used 4mg of Ondansetron for patients in group A.

We chose 75mcg, since the study done by Candiotti K et al[12] concluded that 75mcg of Palonosetron effectively reduced the incidence of PONV when compared to 25mcg and 50mcg.

The study drugs were given just before induction of anaestheisa and all patients were followed for the period of 24 hours post operatively.

In accordance with all previous studies, in our study also, patients demographic profile like age, gender, height, weight, BMI, ASA (PS), duration of surgery, duration of general anaesthesia and duration of pneumo peritoneum, patients with hypertension, patients with diabetes and smoking status were comparable in both Ondansetron and Palonosetron group. This provided an unbiased base to compare the incidence of post operative nausea and vomiting in both the groups.

In our study, the incidence of nausea, retching, vomiting at 24 hrs post procedure in Ondansetron group are 38%, 16% and 28% respectively. The incidence of nausea is 12% in Palonosetron group and vomiting in Palonosetron group is 4%. The incidence of nausea and vomiting are more at period between 6hrs and 24 hrs post procedure. The incidence of nausea is 28% in Ondansetron group and 10 % in Palonosetron group during this period. 18% in Ondansetron group and 4% in Palonosetron group had vomiting at this period. All the patients with vomiting were given Metaclopromide as rescue medication.

The complete responders in Ondansetron group are 62% and in Palonosetron group are 88%. There were no adverse events reported throughout the study in both the groups.

Taninder Singh et al[22] compared incidence of post operative nausea and vomiting between $5HT_3$ receptor antagonist drugs Ondansetron and Palonosetron among patients undergoing middle ear surgeries. The demographic profiles were comparable in their study. In our study also the demographic profiles are comparable in both Ondansetron group and Palonosetron groups. The complete responder in their study was 40% in Ondansetron group and 73.3% in Palonosetron group, where as in our study it is 62% in Ondansetron group and 88% in Palonosetron group. The incidence of nausea and vomiting in Ondansetron group is higher than Palonosetron group [38% Vs 12% and 28% Vs 4%] respectively. These finding are similar to study results of Taninder sing et al. In context to the above it is sure that Palonosetron is superior to Ondansetron in management of PONV.

In 2011, a randomised trial was done by Bajwa SS et al[20] to compare the incidence of PONV in patients undergoing laparoscopic gynecological procedures under general anesthesia. 60 patients were included in their study. They compared the efficacy of 8mg Ondansetron with 75mcg Palonosetron. In our study, Ondansetron 4mg was used to compare the efficacy with Palonosetron 75mcg. There was no difference in demographic profile in our study which is similar to study of Bajwa SS et al. The incidence of nausea in their study was 20% in Ondansetron group where as in our study it is 38% in Ondansetron group. The incidence of nausea in Palonosetron group is 6.67% in their study and 12% in our study. In the study by Bajwa SS et al 13.33% of them had vomiting in Ondansetron group. In this study the incidence is 28 % in Ondansetron group. The

incidence of vomiting in Palonosetron is almost same in both studies. Palonosetron has better efficacy than Ondansetron in controlling the incidence of PONV as per study by Bajwa SS et al which is also same in our study.

Laha B et al[17] evaluated the antiemetic effect of intravenous Palonosetron with Ondansetron in patients undergoing laparoscopic cholecystectomy. The demographic profiles were equal in both the groups in their study which is similar in our study also. The study by Laha B et al concluded that both Ondansetron and Palonosetron are equal in controlling the PONV during first 24 hrs after procedure. But in our study the incidence of PONV in Ondansetron group is more when compared to Palonosetron group. In their study, 26.5% of Ondansetron group patients required rescue medication where as in our study it is 28% of the patients in Ondansetron group required rescue medication. In contrast the requirement of rescue medication in Palonosetron group is only 4% in our study which is low when compared to their study [28.6%].

AbdEl-Hamid et al[18], in the year 2014 has shown Palonosetron was said to be a good antiemetic when compared to Ondansetron in patients undergoing middle ear surgeries. AbdEl-Hamid et al have compared 4mg of Ondansetron with 25mcg of Palonosetron. But we compared 4mg of Ondansetron with 75mcg of Palonosetron. The demographic profiles in both the studies were comparable between groups. In the study by AbdEl-Hamid et al[18], the Ondansetron group had 73.3% of complete responders and 93.3% of them in Palonosetron group were complete responders where as in our study 62% of them in Ondansetron group and 88% of them in Palonosetron group were complete responders. The incidence

of nausea, retching and vomiting is less in Palonosetron group which is similar in our study also.

A randomized, double blind study done in the year 2011 by Park S et al[19], shows that the incidence of PONV is lower in the Palonosetron group than in Ondansetron group. Park S et al has compared the incidence of post operative nausea and vomiting in patients undergoing laparoscopic gynecological procedures. The demographic profiles were comparable in both the groups in their study. They reported that the incidence of PONV in Palonosetron (42.2%) is lower than in the Ondansetron (66.7%) and concluded that Palonosetron 75 mcg was superior to Ondansetron 8 mg in prevention of PONV. In our study, the demographic profiles were comparable between the groups as per their study. The incidence of PONV is also lower in Palonosetron group than Ondansetron group in our study. Hence Palonosetron is superior to Ondansetron in prevention of post operative nausea and vomiting.

In 2012 Moon Y et al[21], in their study have shown that Palonosetron is effective than Ondansetron in high risk patients receiving Fentanyl based PCA. He evaluated this in patients undergoing thyroid surgeries. In this study, Ondansetron group patients also received Ondansetron in PCA which is added to Fentanyl where as in Palonosetron group the patients did not receive either Ondansetron or Palonosetron in Fentanyl based PCA. The incidence of PONV at 24 hour period is 42% in Palonosetron group where as it is 62% in Ondansetron group. There was no much difference in Palonosetron and Ondansetron group in the incidence of PONV at 2hrs. In contrast to our study, the demographic profiles are similar as in

their study. The incidence of PONV is also less in Palonosetron group when compared to Ondansetron group. Similarly our study also showed no significant difference between two groups at 2hrs post procedure. In our study, we did not use patient controlled analgesia in post operative period. All patients were given inj Diclofenac 75mg IV in 100 ml of 0.9% normal saline every 8th hour for management of pain.

Kim S et al[23] evaluated the efficacy of Palonosetron, Ondansetron and Ramosetron in prevention of PONV in patients undergoing laparoscopic surgery. This study concluded that there is less incidence of nausea, retching and vomiting in Palonosetron group when they are compared with Ondansetron and Ramosetron. The incidence of nausea was 22.2% in Palonosetron group where as in Ondansetron it was 77.1% and in Ramosetron it was 60.5%. The incidence of retching was also low in Palonosetron (11.1%) when compared to other two groups. Palonosetron group had 5.6% of vomiting where as Ondansetron had 28.6% and 18.4% in Ramosetron group. In our study incidence of nausea, retching and vomiting are compared between Ondansetron and Palonosetron only. The incidence of nausea in our study is 38% in Ondansetron group and 12% in Palonosetron group which is similar to the study by Kim S et al. The incidence of retching is also less when compared to Ondansetron group. In our study, 28% of them had vomiting in Ondansetron group where as only 4% of them had vomiting in Palonosetron group which is similar to the study by Kim S et al [28.6% Vs 5.6%]. Hence the conclusions that Palonosetron is better than Ondansetron in preventing PONV between study groups were comparable.

Saha D et al[24] in 2011, evaluated the antiemetic efficacy of Ramosetron 30mcg, Palonosetron 75mcg and Ondansetron 8mg whereas in our study, the antiemetic efficacy of Palonosetron and Ondansetron is evaluated. The demographic profiles between the groups were similar in both studies. The study by Saha et al shows that Ramosetron 0.3 mg IV was effective than Palonosetron 75mcg and Ondansetron 8mg in the early postoperative period, but they also said there was no significant difference in the overall incidence of PONV. The complete responders for these drugs are Ramosetron [65.5%], Palonosetron [37.9%] and Ondansetron [34.5%]. The percentages of complete responders were still high in Palonosetron group when compared to Ondansetron which is similar in our study. In our study, the complete responders in patients belonging to Ondansetron group are 62% and 88% in Palonosetron group.

Gupta K et al[25], compared the efficacy of Palonosetron, Ondansetron, and Granisetron in PONV among patients undergoing laparoscopic cholecystectomy and observed that Palonosetron is superior to Granisetron and Ondansetron. In our study, we compared Palonosetron with Ondansetron. The distributions of demographic profiles between the groups were similar as in the study by Gupta K et al. The incidence of nausea was more in Ondansetron [50%] group when compared with Palonosetron [7.5%] and Granisetron [12.5%] as per their study. In our study, 38% of them had nausea in Ondansetron group and 12% in Palonosetron group. In the study by Gupta K et al 42.5% of patients in Ondansetron group had vomiting where as it was 7.5% and 20% in Palonosetron and Granisetron groups respectively. In contrast, we had 28% in Ondansetron group and 4% in

Palonosetron group had vomiting. Hence Palonosetron is superior than Ondansetron in prevention of PONV as similar to study by Gupta K et al[25] which shows Palonosetron is effective than Ondansetron and Granisetron.

SUMMARY

7. SUMMARY

A study titled "**To compare the efficacy of Palonosetron over Ondansetron in prevention of postoperative nausea and vomiting in patients undergoing laparoscopic cholecystectomy under general anesthesia"** was carried out in PSG institute of medical sciences and research from July 2014 to May 2015.

Total of 100 patients were included in study and divided into two groups of 50 each. All patients received study medication as per computer generated randomization code. Data obtained were collected and analyzed with SPSS software

The mean age in both the groups was comparable. The mean age in Ondansetron group was 40.78 ± 10.73 years and the mean age in Palonosetron group was 41.84 ± 10.57years.

There was no statistically significant difference between Ondansetron and Palonosetron groups in terms of gender distribution.

Height, weight and body mass index between the groups were also comparable. There was no statistically significant difference between the groups as p value was more than 0.05.

In our study, 90% of them were non smokers in Ondansetron group and 96% of them in Palonosetron group were non smokers.

In our study, there was no statistically significant difference between Ondansetron group and Palonosetron group in respect to incidence of nausea, retching, vomiting and use of rescue medication after 2 hours post surgery.

Similarly, 6 hours post procedure there was no statistically significant difference between Ondansetron group and Palonosetron group in respect to incidence of nausea, retching, vomiting and use of rescue medication. 94% of them in Ondansetron group and 98% in Palonosetron group did not have any nausea, vomiting and did not require rescue medication.

In our study, 28% and 10% experienced nausea in Ondansetron and Palonosetron group respectively after 24 hours post surgery which is statistically significant as p value is 0.022.

In our study, there was statistically significant difference in incidence of vomiting after 24 hours post surgery. 18% had vomiting in Ondansetron group and 4% had vomiting in Palonosetron group.

Similarly rescue medication was needed in 18% of patients in Ondansetron group and 4% of patients in Palonosetron group which is statistically significant as p value is 0.025.

In our study, 62% of patients did not experience nausea, retching and vomiting in Ondansetron group and 88% of them had no nausea, retching and vomiting in Palonosetron group which was statistically significant.

CONCLUSION

8. CONCLUSION

Based on our study, it is observed that Palonosetron a second generation $5HT_3$ receptor antagonist has prolonged duration of action and has decreased the incidence of post operative nausea and vomiting significantly when compared to Ondansetron, providing patients with lesser episodes of PONV in patients undergoing laparoscopic cholecystectomy under general anesthesia.

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APPENDIX

PSG Institute of Medical Science and Research, Coimbatore

Institutional Human Ethics Committee

INFORMED CONSENT FORMAT FOR RESEARCH PROJECTS

I Dr.S.Giridharan am carrying out a study on the topic "To compare the efficacy of Palonosetron over Ondansetron in prevention of postoperative nausea and vomiting in patients undergoing laparoscopic cholecystectomy under general anesthesia" as part of my research project being carried out under the aegis of the Department of Anaesthesiology.

My research guide is: Dr.Prabha Udayakumar, Professor, Department of Anaesthesiology,PSGIMS & R.

The justification for this study

Post operative nausea and vomiting is one of the most common side effects following surgery under general anaesthesia. The incidence of post operative nausea and vomiting ranges between 40–75% during first 24 hours of post operative period following laparoscopic cholecystectomy. There are many drugs to prevent the post operative nausea and vomiting. The 5 HT_3 receptors are most commonly used for prevention of post operative nausea and vomiting. Palonosetron being a newer drug with less adverse affects than other drugs we wished to carry out this study.

The objectives of this study are:

Primary Objective is to compare the efficacy of Palonosetron over Ondansetron in prevention of postoperative nausea and vomiting in patients undergoing laparoscopic cholecystectomy under general anaesthesia.

Sample size: 100

Study participants are of patients whose age is more than 18 years and less than 60 years and both males and females.

We request you to kindly cooperate with us in this study. We propose collect background information and other relevant details related to this study.

Data collected will be stored for a period of 3 years. We will not use the data as part of another study.

Medication given, if any, duration, side effects, purpose, benefits:

Palonosetron and Ondansetron are being given. These drugs are used for prevention of post operative nausea and vomiting. The side effects of these drugs are headache, drowsiness, fatigue and abdominal pain.

Whether medication given is part of routine procedure: Yes

Whether alternatives are available for medication given: Yes

Benefits from this study: It helps in choosing better drug for prevention of post operative nausea and vomiting.

Risks involved by participating in this study: NIL

The results of this study will be used to help patients in giving better drug for post operative nausea and vomiting.

If you are uncomfortable in answering any of our questions during the course of the study you have the right to withdraw from the study at anytime. You have the freedom to withdraw from the study at any point of time. Kindly be assured that your refusal to participate or withdrawal at any stage, if you so decide, will not result in any form of compromise or discrimination in the services offered nor would it attract any penalty. You will continue to have access to the regular services offered to a patient. You will not be paid any remuneration for the time you spend with us for this study. The information provided by you will be kept in strict confidence. Under no circumstances shall we reveal the identity of the respondent or their families to anyone. The information that we collect shall be used for approved research purposes only. You will be informed about any significant new findings - including adverse events, if any, – whether directly related to you or to other participants of this study, developed during the course of this research which may relate to your willingness to continue participation.

Consent: The above information regarding the study, has been read by me/ read to me, and has been explained to me by the investigator/s. Having understood the same, I hereby give my consent to them to interview me. I am affixing my signature / left thumb impression to indicate my consent and willingness to participate in this study (i.e., willingly abide by the project requirements).

Signature / Left thumb impression of the Study Volunteer / Legal Representative

Signature of the Interviewer with date: Witness:

Contact number of PI: 9943701661

Contact number of Ethics Committee Office: 0422 2570170 Extn. : 5818

ஒப்புதல் படிவம்

டாக்டர் கிரிதரன் ஆகிய நான் PSG மருத்துவக் கல்லூரியின் மயக்கவியல் துறையின் மேற்படிப்பின் ஒரு பகுதியாக, ஒப்பீடு முறையில் பெலனோசெட்ரான் மற்றும் ஆண்டன்செட்ரான் என்கிற மருந்துகள் மூலம் கல்லீரல் பித்தப்பைகற்களை துளையிட்டு அறுவை சிகிச்சை செய்யும் பின்பு ஏற்படும் வாந்தி மற்றும் குமத்தல் ஆகியவற்றை தடுப்பதற்கான சிறந்த மருந்து எது என்ற தலைப்பில் ஆய்வு மேற்கொள்ள உள்ளேன்.

என் ஆய்வ்வு வழிகாட்டிடி டாக்டர் பிரபா உதயகுமார்
பேராசிரியர்
மயக்கவியல் துறை
PSG மருத்துவக் கல்லூரி.

ஆய்வ்வு மேற்கொள்வ்வதற்கான அடிப்ப்படை

கல்லீரல் பித்தப்பை கற்களை துளையிட்டு அறுவை சிகிச்சை செய்யும் பின்பு ஏற்படும் வாந்தி மற்றும் குமத்தல் ஆகியவை சுமார் 40 – 70 % வரை, முதல் 24 மணி நேரத்தில் ஏற்படுவது இயல்பு. பல வகையான மருந்துகள் இத்தகைய பிரச்சனைகளுக்கு நிவாரணியாக உள்ளது.

பெலனோசெட்ரான் என்னும் புதிய மருந்து இத்தகைய பிரச்சனைகளுக்கு நிவாரணியாக உள்ளதால் இந்த ஆய்வு மேற்கொள்ள உள்ளேன். ஆய்வ்வின் நோக்க்கம் முழு மயக்கத்தின் கீழ் கல்லீரல் பித்தப்பை கற்களை துளையிட்டு அறுவை சிகிச்சை செய்யும் பின்பு ஏற்படும் வாந்தி மற்றும் குமத்தல் ஆகியவற்றை தடுப்பதற்கான, பெலனோசெட்ரான் மற்றும் ஆண்டன்செட்ரான் என்கிற மருந்துகளை ஒப்பிடுதல்.

ஆய்வ்வில் பங்குகு பெறும் நபர்க்களின் எண்ண்ணிக்க்கை 100
ஆய்வ்வு மேற்கொள்ளுளும் இடம் PSG மருத்துவக் கல்லூரி

ஆய்வ்வின் பலன்க்கள்

அறுவை சிகிச்சை செய்யும் பின்பு ஏற்படும் வாந்தி மற்றும் குமத்தல் ஆகியவற்றை தடுப்பதற்கு உதவுகிறது.

ஆய்வ்வினால் ஏற்ப்படும் அசௌகரியங்க்கள் எதுவும் இல்லை

இந்த ஆய்வில் கிடைக்கும் தகவல்கள் 3 வருடங்கள் பாதுகாக்கப்படும். இவை வேறு எந்த ஆய்விற்கும் பயன்படுத்தப் பட மாட்டாது. ஏந்த நிலையிலும் உங்களைப் பற்றிய தகவல்கள் யாருக்கும் தெரிவிக்கப்பட மாட்டாது. அவை இரகசியமாக வைக்கப்படும். இந்த ஆய்வில் பங்கேற்க ஒப்புக்கொள்வதால் எந்த விதமான பலனும் உங்களுக்குக் கிடையாது. எந்த நேரத்தில் வேண்டுமானாலும் ஆய்விலிருந்து விலகிக்கொள்ளும் உரிமை உங்களுக்கு உண்டு. ஆய்விலிருந்து விலகிக்கொள்வதால் உங்களுக்கு அளிக்கப்படும் சிகிச்சையில் எந்த வித மாற்றமும் இருக்காது.

மேலும் இந்த ஆய்வில் பங்கு கொள்வது உங்கள் சொந்த விருப்பம். இதில் எந்த விதக் கட்டாயமும் இல்லை. நீங்கள் விருப்பப்பட்டால் இந்த ஆய்வின முடிவுகள் உங்களுக்குத் தெரியப்படுத்தப்படும்.

ஆய்வாளரின் கையொப்பம் தேதி

ஆய்வ்வுக்குட்ப்படுபவரின் ஓப்ப்புதல்

நான் இந்த ஆய்வின் நோக்கம் மற்றும் அதன் பயன்பாட்டினைப் பற்றி தெளிவாக தெரியப்படுத்தப் பட்டுள்ளேன். இந்த ஆய்வில் பங்கு கொள்ளவும், இந்த ஆராய்ச்சியின் மருத்துவரீதியான குறிப்புகளை வரும் காலத்திலும் உபயோகப்படுத்திக் கொள்ளவும் முழு மனதுடன் சம்மதிக்கிறேன்.

ஆய்வுக்குட்படுபவரின் பெயர் மற்றும் கையொப்பம்

தேதி

ஆய்வாளரின் தொலைபேசி எண் 9943701661

மனித நெறிமுறைக் குழு அலுவலகத்தின் தொலைபேசி எண் 04222570170

EXTN 5818

COMPUTER GENERATED RANDOM NUMBERS

GROUP – A	GROUP - B	GROUP – A	GROUP - B
56	26	67	96
23	88	59	21
4	35	100	97
59	27	25	51
1	54	62	87
87	98	66	41
13	94	65	89
23	34	7	99
50	86	70	50
48	37	89	85
74	78	53	5
8	100	23	22
22	88	36	61
3	40	55	86
2	21	71	68
9	4	55	70
4	30	57	9
90	35	99	79
3	53	7	55
5	72	33	90
84	5	91	84
70	87	40	72
6	91	78	67
90	55	8	29
58	18	86	24

PROFORMA							
NAME				**IP NO**		**SERIAL NO**	
AGE		**WEIGHT**		**HEIGHT**		**BMI**	
GENDER	MALE	FEMALE		**ASA**	I		II
SMOKER	YES	NO		**ALCOHOL**	YES		NO
HTN	YES	NO		**DIABETIC**	YES		NO
HOMS	YES	NO					
DURATION OF SURGERY [DOS]	< 1 HR			1 – 2 HR		>2 HR	
DURATION OF GA[DOGA]	< 1 HR			1 – 2 HR		>2 HR	
GAS INSUFFLATION TIME	< 1 HR			1 – 2 HR		>2 HR	
INTRA ABD PRESSURE[IAP]	<10			11 - 14		>14	
DURATION OF SURGERY IN MINUTES [DOSM]				_____MINUTES			
DURATION OF GA IN MINUTES [DOGAM]				_____MINUTES			
PNEUMO TIME IN MINUTES [GAS]				_____MINUTES			
TOTAL CO_2 [TCO]	<100 L	101 – 150 L	151 – 200 L	>200 L			
	0 – 2 HR [2H]		**2 – 6 HR [6H]**		**6 – 24 HR [24H]**		
NAUSEA [NA]	YES	NO	YES	NO	YES	NO	
RETCHING [RE]	YES	NO	YES	NO	YES	NO	
VOMITING [VO]	YES	NO	YES	NO	YES	NO	
RESCUE MEDICATION [RM]	YES	NO	YES	NO	YES	NO	
REMARKS							
HTN – HYPERTENSION, HOMS – H/O MOTION SICKNESS							