

Qanun Medika : Jurnal Kedokteran Fakultas Kedokteran Universitas Muhammadiyah Surabaya

eISSN : 2548-9526 | pISSN : 2541-2272

Health

[Universitas Muhammadiyah Surabaya](#)



S3

Sinta Score



Indexed by GARUDA

3

H-Index

3

H5-Index

41

Citations

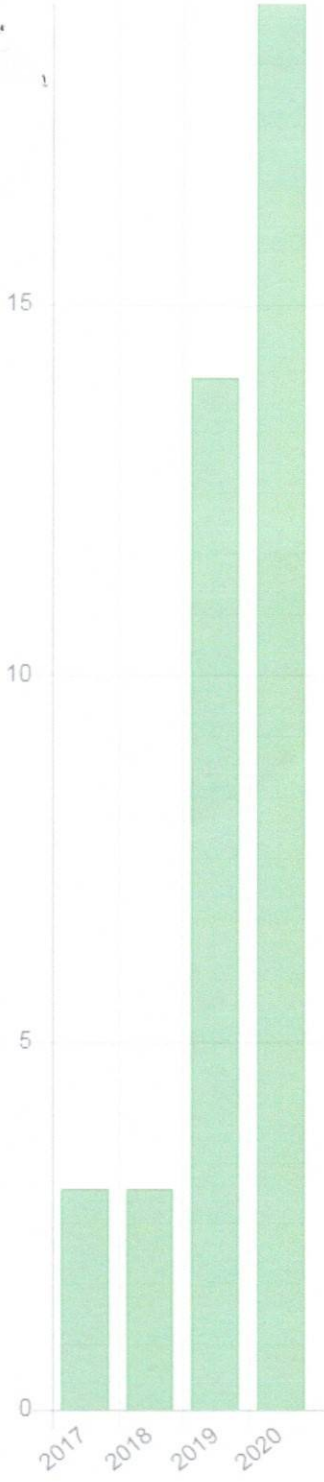
41

5 Year Citations



Penerbit:

[Website](#) | [Editor URL](#)



Copyright © 2017

Kementerian Riset dan Teknologi / Badan Riset dan Inovasi Nasional

(Ministry of Research and Technology / National Agency for Research and Innovation)

All Rights Reserved.

Effectiveness of core stability exercise for knee joint osteoarthritis: A review
Rahmatul Huda, Nurhidayah, Nurhidayah, Nurhidayah

Role of intubated rabbit cecum in pregnancy with Downinger syndrome
Rahmatul Huda, Nurhidayah, Nurhidayah, Nurhidayah

Fiber consumption effect on non-communicable disease: How big is the impact?
Laila Nurhidayah

The relationship of smoking with the quality of life on chronic obstructive pulmonary
disease patients at Dr. Roesadewiyi Hospital, Padang
Djoni Sidiq, Nurhidayah, Nurhidayah, Nurhidayah

Relationships between body mass index with cholelithiasis
Nurhidayah, Nurhidayah, Nurhidayah, Nurhidayah

Contamination of water and soil of rice fields with soil transmitted helminths as source of
transmission to farmers in Grogol sub-district, Kediri district
Nurhidayah, Nurhidayah, Nurhidayah, Nurhidayah

Zero maternal death with KEDUBUNG featured in SATE Kerebung application
(integrated queue system) in Kerebung Community Health Center in 2017 until 2018
Ari Purwati, Nurhidayah

Sensitivity and specificity comparison between Appt, Kalvaranta, and
Nucleic acid as PAV1 predictor in post-pruritic scabies patient
Nurhidayah, Nurhidayah, Nurhidayah, Nurhidayah

Wild Tembakok plant (*Lantana camara*) as a potential bioactive natural product against
Staphylococcus pyogenes in Indonesia
Rahmatul Huda, Nurhidayah, Nurhidayah, Nurhidayah

Ankle arthrodesis with cancellated screw: Case series
Nurhidayah, Nurhidayah, Nurhidayah, Nurhidayah

Anatomical and social factors at post-sterilization operation in Mayri Rokitamko, Kaster Ilazir
Syahidre (MRS) patients with sigmoid, anal, and recto-sigmoid methods in Dr. Soetomo Hospital
Surabaya
Nurhidayah, Nurhidayah, Nurhidayah, Nurhidayah

Tumor mimicking in musculoskeletal system in Surabaya: A case series
Nurhidayah, Nurhidayah, Nurhidayah, Nurhidayah

Pregnancy with Myositis Gravis
Nurhidayah, Nurhidayah, Nurhidayah, Nurhidayah

Collecting duct carcinoma: A rare entity
Nurhidayah, Nurhidayah, Nurhidayah, Nurhidayah

Synovial chondrosarcoma in women with symptoms mimicking early stages osteoarthritis
Nurhidayah, Nurhidayah, Nurhidayah, Nurhidayah

diterbitkan oleh
Fakultas Kedokteran
Universitas Muhammadiyah Surabaya

2020

User

Username
Password

Remember me

[Login](#)

Language

Select Language

English

[Submit](#)

Notifications

[» View](#)

[» Subscribe](#)

Journal Content

Search

Search Scope

All

[Search](#)

Browse

[» By Issue](#)

[» By Author](#)

[» By Title](#)

[» Other Journals](#)

Information

[» For Readers](#)

[» For Authors](#)

[» For Librarians](#)

[Focus and Scope](#)

[Editorial Board](#)

[Home](#) / [About the Journal](#) / [Editorial Team](#)

Editor in Chief

» [Yelvi Levani](#), (Scopus ID: 55200360700) (Sinta ID: 6689408) Faculty of Medicine Muhammadiyah University of Surabaya, Indonesia

Editor

» [Jan L Nouwen](#), (Scopus ID : 7004057332) Erasmus MC University Medical Center Rotterdam, Netherlands

» [Abdullah Al Tarique](#), (Scopus ID : 25960456000) Child Health Research Centre Faculty of Medicine, University Queensland, Australia

» [Prof Takashi Yashiro](#), (Scopus ID : 7007120815) JICHI Medical University School of Medicine, Japan

» [Prof Murat Coskun](#), (Scopus ID : 24079683800) Istanbul University, Istanbul, Turkey, Turkey

» [Muhammad Anas](#), (Scopus ID: 57192299850) Medical Faculty University Muhammadiyah of Surabaya, Indones

» [Suhartono Taat Putra](#), (Scopus ID: 57194008862) Departemen Patobiologi Universitas Airlangga Surabaya, Ind-Indonesia

» [Azis Alimul Hidayat](#), (Scopus ID:57203654137) Universitas Muhammadiyah Surabaya, Indonesia

Section Editor

» [Syafarinah Nur Hidayah Akil](#), Faculty of Medicine, Muhammadiyah University of Surabaya, Indonesia

» [Ayu Lidya Paramita](#), Faculty of Medicine Muhammadiyah University of Surabaya, Indonesia

Layout Editor

» [Dede Nasrullah](#), (Scopus ID : 57212390877) Departement Nursing Faculty of Health, University Muhammadiyah Surabaya, Indonesia

0133419

[View My Stat](#)



Managed Hosting, Support, and OJS Responsive Theme by:
OpenJournalSystems.com



QANUN MEDIKA

Jurnal Kedokteran

Fakultas Kedokteran Universitas Muhammadiyah Surabaya

p-issn 254-2272 e-issn 2548-9526

website : <http://journal.um-surabaya.ac.id/index.php/qanunmedika>



- [Home](#)
[About](#)
[Login](#)
[Register](#)
[Search](#)
[Current](#)
[Archives](#)
[Announcements](#)
[Ethical Publication](#)
- [Visitor Stat](#)
[Template Download](#)
[Author Guidelines](#)
[Editorial Team](#)
[Reviewer](#)
[Focus and Scope](#)

User

Username

Password

Remember me

Login

Language

Select Language

English

Notifications

- » View
- » Subscribe

Journal Content

Search

Search Scope

All

Search

Browse

- » By Issue
- » By Author
- » By Title
- » Other Journals

Information

- » For Readers
- » For Authors
- » For Librarians

Focus and Scope

Home / Archives / Vol 4, No 1 (2020)

DOI: <http://dx.doi.org/10.30651/jqm.v4i1>

Full Issue

View or download the full issue

[Full Issue](#)

Table of Contents

Literature Review

Effectiveness of core stability exercise for knee joint osteoarthritis: A review	P
Muhammad Deyu Wisnubrata, Rahmat Sayyid Zharfan	:
Role Of Inhaled Nitric Oxides In Pregnancy With Eisenmenger Syndrome	P
Muhammad Anas, Nenny Triastuti, Muhammad Perdana Airlangga	11-
Fiber consumption effect on non-communicable disease: how big is the impact?	P
Yuli Indarti	27-

Articles

Relationship between Smoking and Quality Of Life on Patient's with Chronic Obstructive Pulmonary Disease In Dr.Reksodiwiryoo Padang Hospital	P
Dita Hasni, Jely Safitri, Nadia Purnama Dewi, Nilas Warlem	:
Relationships Between Body Mass Index with Cholelithiasis	P
Husin Thamrin, Nadieda Ayu Marthalitasari, Subur Prajitno	43-
Contamination of water and soil of rice fields with soil transmitted helminths as source of transmission to farmers in Grogol sub-district, Kediri district	P
Siti Munawaroh, Heny Arwati, Puspa Wardhani	:
Zero Maternal Death with KECUBUNG Featured in SATE Krembung Application (Integrated Queue System) in Krembung Community Health Center in 2017 until 2018	P
Arif Rahman Nurdianto	:
Sensitivity and Specificity Comparison Between APFEL, KOIVURANTA, and SINCLAIR Score As PONV Predictor In Post General Anesthesia Patient	P
M Yusuf Gunawan, Arie Utariani, Maulydia Maulydia, Anna Surgeon Veterini	:
Wild tembelek plant (Lantana camara) as a potential bioactive natural product againts Streptococcus pyogenes in Indonesia	P
Ricky Indra Alfaray, Rafiqy Sa'adiy Faizun, Lionardy Yodianto, Saruuljavkhlan Batsaikhan, Yudith Annisa Ayu Rezkitha	:


Case Report

Ankle Arthrodesis with Cannulated Screw: Case Series	P
--	---

User 

Language 

Notifications 

Journal Content 

Information 

[Home / Vol 4, No 1 \(2020\) Gunawan](#)

Sensitivity and Specificity Comparison Between APFEL, KOIVURANTA, and SINCLAIR Score As PONV Predictor In Post General Anesthesia Patient

M Yusuf Gunawan, Arie Utariani, Maulydia Maulydia, Anna Surgean Veterini

Abstract

ABSTRACT

Background: Post Operative Nausea Vomiting (PONV) are the two most common and unpleasant side effects after anesthesia and surgery. Without proper prophylactic administration, the PONV incidence is currently around 20% in normal patients and 70% in high-risk patients (Butterworth et al., 2013). Recently, many PONV predictor score been used to determine the PONV severity and prophylactic administration. Objective: To compare the scores of Koivuranta, and Sinclair as predictors of PONV in adult patients after general anesthesia at RSUD Dr. Soetomo.

Methods: A cross-sectional study design conducted in 100 patients who underwent elective surgery under general anesthesia at RSUD Dr. Soetomo Surabaya. Patients who meet the criteria will be recorded in the clinical research and being followed to evaluate the assessment using Apfel, Koivuranta, and Sinclair scores when the patient is in the recovery room and the ward. A diagnostic test is performed to assess the accuracy between these scores. **Results** study, the prevalence of PONV after general anesthesia in elective surgery at GBPT RSUD Dr Soetomo Surabaya The Apfel score obtained has a sensitivity value of 79.5%, a specificity of 45.9% with an AUC value of 0.701. The Koivuranta score has a sensitivity value of 96.2%, a specificity of 27% with an AUC value of 0.628. The Sinclair score has a sensitivity value of 73.1%, a specificity of 48.6% with an AUC value of 0.619. **Conclusion:** Apfel's score is more a PONV prediction score and has a simpler score determination variable.

Keywords : PONV, predictor score, apfel score, koivuranta score, sinclair score, general anesthesia.

Keywords

PONV, predictor score, apfel score, koivuranta score, sinclair score, general anesthesia

Full Text:

[PDF](#)

References

Apfel, C.C., Heidrich, F. M., Jukar-Rao, S., Jalota, L., Hornuss, C., Whelan, R. P., ... Cakmakaya, O. S. (2012). Evidenced based analysis of risk factors for postoperative nausea and vomiting †. *British Journal of Anaesthesia*, 109(5), 742 <https://doi.org/10.1093/bja/aes276>

Apfel, C.C., Kranke, P., Eberhart, L. H. J., Roos, A., & Roewer, N. (2002). Comparison of predictive models for postoperative nausea and vomiting. *British Journal of Anaesthesia*, 88(2), 234–240. <https://doi.org/10.1093/bja/88.2.234>

Apfel, Christian C., Läärä, E., Koivuranta, M., Greim, C.-A., & Roewer, N. (1999). A Simplified Risk Score for Predict Postoperative Nausea and Vomiting. *Anesthesiology*, 91(3), 693. <https://doi.org/10.1097/00000542-199909000>

Butterworth, J.F., Mackey, D.C., Wasnick, J.D., Morgan, G.E., Mikhail, M.S., Morgan, G.E. (2018). *Morgan and Mikhail clinical anesthesiology* (6th ed.). The McGraw-Hill Companies.

Dahlan, S. (2014). *Statistik untuk kedokteran dan kesehatan* (6th ed.). Jakarta: Salemba Medika.

Erkalp, K., Kalekoglu Erkalp, N., Sevidi, M. S., Korkut, A. Y., Yeter, H., Ege, S. S., ... Erden, V. (2014). Gastric Decompre Decreases Postoperative Nausea and Vomiting in ENT Surgery. *International Journal of Otolaryngology*, 2014, 1- <https://doi.org/10.1155/2014/275860>

Habib, A. S., Chen, Y.-T., Taguchi, A., Henry Hu, X., & Gan, T. J. (2006). Postoperative nausea and vomiting following inpatient surgeries in a teaching hospital: a retrospective database analysis. *Current Medical Research and Opini* 22(6), 1093–1099. <https://doi.org/10.1185/030079906X104830>

Koivuranta, M., Läärä, E., Snäre, L., & Alahuhta, S. (1997). A survey of postoperative nausea and vomiting. *Anaesth* 52(5), 443–449. <https://doi.org/10.1111/j.1365-2044.1997.117-az0113.x>

Pierre, S., Benais, H., & Pouymayou, J. (2002). Apfel's simplified score may favourably predict the risk of postopera nausea and vomiting. *Canadian Journal of Anesthesia/Journal Canadien d'anesthésie*, 49(3), 237–242. <https://doi.org/10.1007/BF03020521>

Sinclair, D. R., Chung, F., & Mezei, G. (1999). Can postoperative nausea and vomiting be predicted? *Anesthesiology* 109–118. <https://doi.org/10.1097/00000542-199907000-00018>

Tramèr, M. R., & Fuchs-Buder, T. (1999). Omitting antagonism of neuromuscular block: effect on postoperative na and vomiting and risk of residual paralysis. A systematic review. *British Journal of Anaesthesia*, 82(3), 379–386. <https://doi.org/10.1093/bja/82.3.379>

DOI: <http://dx.doi.org/10.30651/jqm.v4i1.2826>

0133417

[View My Stat](#)



Managed Hosting, Support, and OJS Responsive Theme by:
OpenJournalSystems.com



QANUN MEDIKA

JURNAL KEDOKTERAN FKUM SURABAYA

<http://journal.um-surabaya.ac.id/index.php/qanunmedika>



Research Article

Sensitivity and specificity comparison between *Apfel*, *Koivuranta*, and Sinclair score as *PONV* predictor in post general anesthesia patient

Muhammad Yusuf Gunawan^{1*}, Arie Utariani², Maulydia³, Anna Surgean Veterini⁴

1) Resident of Department/SMF of Anesthesiology and Intensive Therapy, Faculty of Medicine, Airlangga University – RSUD Dr. Soetomo Surabaya

2,3,4) Staff of Department/SMF of Anesthesiology and Intensive Therapy, Faculty of Medicine, Airlangga University – RSUD Dr. Soetomo Surabaya

ARTICLE INFO

Submitted : June 2019

Accepted : January 2019

Published : January 2020

Keywords:

PONV, predictor score, apfel score, koivuranta score, sinclair score, general anesthesia.

Correspondence:

yusufanest@gmail.com

ABSTRACT

Post Operative Nausea Vomiting (PONV) are the two most common and unpleasant side effects after anesthesia and surgery. Without proper prophylactic administration, the PONV incidence is currently around 20% -30% in normal patients and 70% in high-risk patients (Butterworth et al., 2013). Recently, many PONV predictor scores have been used to determine the PONV severity and prophylactic administration. Objective: To compare the scores of Apfel, Koivuranta, and Sinclair as predictors of PONV in adult patients after general anesthesia at RSUD Dr. Soetomo. A cross-sectional study design conducted in 100 patients who underwent elective surgery under general anesthesia at RSUD Dr. Soetomo Surabaya. Patients who meet the criteria will be recorded in the clinical research form and being followed to evaluate the assessment using Apfel, Koivuranta, and Sinclair scores when the patient is in the recovery room and the ward. A diagnostic test is performed to assess the accuracy between these scores. In this study, the prevalence of PONV after general anesthesia in elective surgery at GBPT RSUD Dr Soetomo Surabaya is 26%. The Apfel score obtained has a sensitivity value of 79.5%, a specificity of 45.9% with an AUC value of 0.701. The Koivuranta score has a sensitivity value of 96.2%, a specificity of 27% with an AUC value of 0.628. The Sinclair score has a sensitivity value of 73.1%, a specificity of 48.6% with an AUC value of 0.619. Apfel's score is more accurate PONV prediction score and has a simpler score determination variable.



INTRODUCTION

Post-Operative Nausea Vomiting (PONV) are the two most common and unpleasant side effects after anesthesia and surgery. Without prophylactic administration, the overall incidence of PONV is currently around 20%-30% and in patients at high-risk PONV conditions, this incidence is as high as 70% (Butterworth, J.F., Mackey, D.C., Wasnick, J.D., Morgan, G.E., Mikhail, M.S., Morgan, G.E, 2018).

PONV condition is a simple problem yet often complained by the patient rather than post-operative pain (Tramèr & Fuchs-Buder, 1999). PONV would affect to worse operation's outcome and increase the risk of aspiration (Butterworth, J.F., Mackey, D.C., Wasnick, J.D., Morgan, G.E., Mikhail, M.S., Morgan, G.E, 2018). These effects may increase the morbidity; prolong the hospitalized period, and increase the hospitalized cost. On the other hand, these effects may cause a patient's stress and discomfort (Habib, Chen, Taguchi, Henry Hu, & Gan, 2006).

Recently, PONV predictor score has been used to classify patients based on their PONV risk. This classification would be useful for the clinician to give PONV prophylactic to the patient. Some of these PONV predictor scores are Apfel score, Koivuranta score, Sinclair score, Palazzo score, Gan score, and Scholz score. Unfortunately, there was no literature that compares these scores to know which predictive score can be used as a gold standard in predicting PONV based on its' accuracy. Because of that, the researcher was interested in experimenting with comparing the sensitivity and specificity of Apfel, Koivuranta, and Sinclair score as PONV predictor in post general anesthesia patient in RSUD Dr Soetomo Surabaya, Indonesia. The researcher hoped that the outcome of this study could find the most perfect PONV predictor

score to be used in the daily assessment of post general anesthesia patients, especially in RSUD Dr Soetomo Surabaya, Indonesia.

METHODS

This study was observational descriptive with a cross-sectional design study. This study has been ethically approved by Komite Etik Penelitian Kesehatan RSUD Dr. Soetomo Surabaya under the ethical clearance certificate number of 0622/KEPK/Ix/2018. The sample of this study was 100 patients who have undergone an elective operation with general anesthesia in RSUD Dr. Soetomo Surabaya, Indonesia during September – October 2018 that met the inclusion and exclusion criteria. The inclusion criteria of this study were: (1) patient with age of 17 – 65 years old; (2) ASA (American Society of Anesthesiologists) Physical Status Score of 1 – 2; (3) patient with elective surgery in GBPT RSUD Dr. Soetomo Surabaya, Indonesia; (4) the general anesthesia was done with isoflurane inhalation anesthesia. Meanwhile, the exclusion criteria of this study were: (1) patient with antiemetic drugs during the operation (perioperative); (2) patient with high intracranial pressure; (3) patient with pregnancy; (4) patient with TIVA (Total Intra-Venous Anesthesia) general anesthesia procedure; and (5) patient who refused to be included in this study.

The patient that met the criteria were collected as a study's subject with random sampling. These subjects were interviewed to assess the PONV predictor score. The PONV predictor score used were Apfel score, Kovuiranta score, and Sinclair score that were recorded in the clinical research form. All of the study's subjects were fasted for 8 hours before the operation and received isoflurane inhalation and O₂ as a general anesthesia procedure during the operation. After the operation, the subjects were observed in the recovery room until the subject gained an Aldrete score of ≥ 9 . When the



QANUN MEDIKA

JURNAL KEDOKTERAN FKUM SURABAYA

<http://journal.um-surabaya.ac.id/index.php/qanunmedika>



subjects had an Aldrete score of ≥ 9 , the subjects were moved to the inpatient room.

The PONV predictor score was assessed by anesthesiology residents who were in charged of pain and recovery room rotation in 24 hours post-operative. The subjects were classified into PONV if there were vomiting, nausea, and retching in 24 hours. If the subjects experienced the PONV symptoms above, the management given were maintained the airway, tilt the patient's head, give ondansetron 4mg or metoclopramide 10mg as pharmacotherapy, and maintain the hydration state.

The data collected then being analyzed with SPSS software. The descriptive data valued with their frequency, average, and standard deviation. The significance limit was 5% and a confidence interval was 95%. The analytic data were analyzed to find the sensitivity, specificity, and AUC of every score.

RESULTS

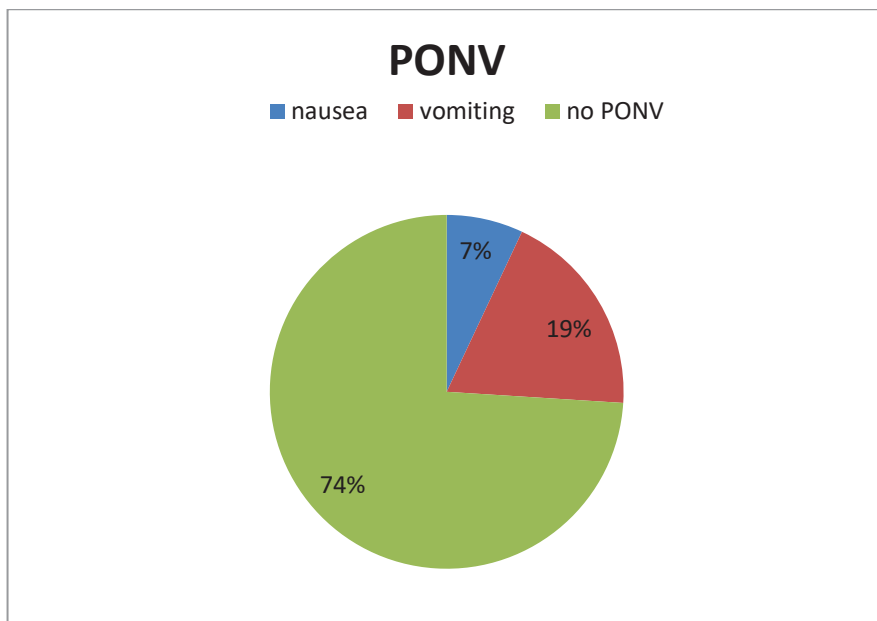
100 patients that became the subject of this study consisted of 53 males and 47 females. The characteristic of the subject was described in table 1.

The type of operation undergone by the subjects were ophthalmology operation 15 patients (15%), urology operation 15 patients (15%), ENT (ear, nose, and throat) operation 14 patients (14%), orthopedic operation 11 patients (11%), oncology operation 8 patients (8%), digestive operation 8 patients (8%), head and neck surgery operation 8 patients (8%), plastic surgery operation 8 patients (8%), oral surgery operation 7 patients (7%), and gynecology operation 6 orang (6%).

From this study, 26 patients experienced PONV. 7 (7%) patients among them had nausea, and 19 (19%) patients among them had vomiting. The highest PONV incidence was happened to head and neck surgery patients as many as 4 patients (15%) and digestive patients as many as 4 patients (15%). The incidence of PONV based on gender was 12 patients male and 14 patients female.

Table 1. the characteristic of subjects

	Amount(%)	Mean \pm SD
Gender		
Male	53 (53)	-
Female	47 (47)	-
Smoking status		
Not smoking	77 (77)	-
Smoking	23 (23)	-
ASA score		
I	25 (25)	-
II	75 (75)	-
Age		
(17-65 years old)	-	43.30 \pm 14.046
Body mass		
(40-90 kg)	-	59.38 \pm 10.766
History		
Motion Sickness	5 (5)	-
PONV	3 (3)	-



Graphic 1. The frequency of PONV in subjects

Table 2. the frequency of PONV based on the type of operation

Type of operation	Amount	PONV	No PONV
Ophthalmology	15	1 (6.7%)	14 (93.3)
Urology	15	3 (20%)	12 (80%)
ENT	14	2 (14.3%)	12 (85.7%)
Orthopaedic	11	3 (27.3%)	8 (72.7%)
Digestive	8	4 (50%)	4 (50%)
Plastic surgery	8	3 (37.5%)	5 (62.5%)
Oncology	8	3 (37.5%)	5 (62.5%)
Head and neck surgery	8	4 (50%)	4 (50%)
Oral surgery	7	2 (28.6%)	5 (71.4%)
Gynecology	6	1 (16.7%)	5 (83.3%)

The analysis result of sensitivity and specificity of Apfel score were described by figure 1.

Figure 1 shows that the sensitivity of the Apfel score was 79.5%, the specificity was 45.9%, and the AUC score was 0.701 with the cutoff point of >1.

From the ROC curve (Figure 2), the Koivuranta score has a sensitivity of 96.2%, the specificity of 27%, and AUC 0.6 with the cutoff point of >1.

From the ROC curve (Figure 3), the Sinclair score has a sensitivity of 73.1%, the specificity of 48.6%, and AUC 0.619 with a cutoff point of >4.



QANUN MEDIKA

JURNAL KEDOKTERAN FKUM SURABAYA

<http://journal.um-surabaya.ac.id/index.php/qanunmedika>

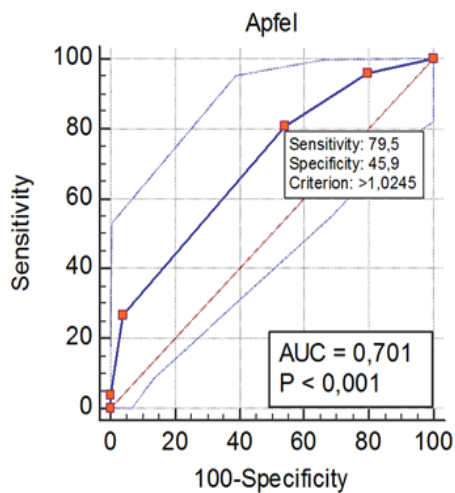


Figure 1. the ROC curve of Apfel score

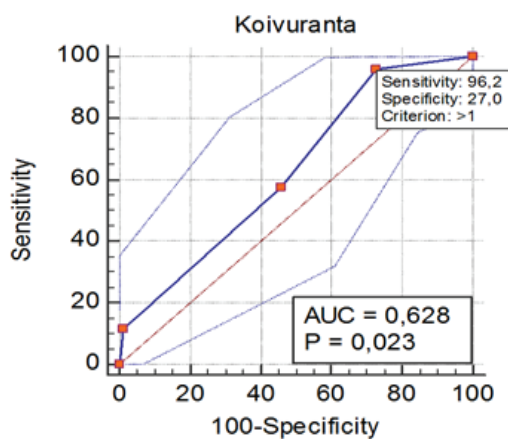


Figure 2. ROC curve of Koivuranta score

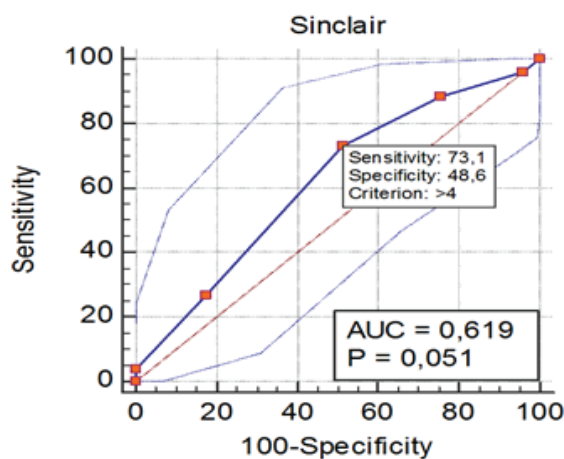


Figure 3. ROC curve of Sinclair score

Table 3. the diagnostic result based on the ROC curve of Apfel, Koivuranta, and Sinclair score

	Sensitivity	Specificity	AUC	p-value
Apfel	79.5%	45.9%	0.701	< 0,001
Koivuranta	95.2%	27%	0.628	= 0,023
Sinclair	73.1%	48.6%	0.619	= 0,051



DISCUSSION

Recently, PONV predictive score has been used to lower the risk or to prevent the incidence of PONV. With this predictive score, the clinicians could classify the patients based on the PONV risk and quickly decide which patient, the PONV prophylactic should be given. The prophylactic of PONV is only given to those with the high-risk result of the predictive score because the PONV prophylactic given to a patient with low risk of PONV does not have a therapeutic effect (Apfel, Läärä, Koivuranta, Greim, & Roewer, 1999).

Apfel score identified the PONV risk with 4 indicators; women (1), PONV or motion sickness history (1), no smoking (1), and the usage of postoperative opioids inpatient (1). Every point increased on the Apfel score will increase the PONV possibility to 18% – 22%. The patient with Apfel score of 0 – 1 identified as low PONV risk, score 2 as moderate PONV risk, and score 3 – 4 as high PONV risk (Christian C. Apfel et al., 1999).

On the other hand, the Koivuranta score predicted the risk of PONV incidence using 5 criteria; women (1), no smoking (1), PONV history (1), motion sickness history (1), and the operation duration > 60 minutes (1). The patient who gets a score of 0 – 1 identified as low PONV risk, score 2 – 3 as medium PONV risk, and score of 4 – 5 as high PONV risk (Koivuranta, Läärä, Snäre, & Alahuhta, 1997).

Last but not least, Sinclair scores use 7 indicators to predict PONV risk on the patient. These indicators are age < 50 years old (1), women (1), no smoking (1), PONV history (1), motion sickness history (1), the type of operation (ENT, ophthalmology, plastic, abdomen, gynecology, and orthopedic especially the shoulder and knee operation) (1), general anesthesia (1), and the anesthesia

duration > 30 minutes. The patient who gets Sinclair score of 0 – 2 identified as low PONV risk, score of 3 – 5 as medium PONV risk, and score of 6 – 7 as high PONV risk (Sinclair, Chung, & Mezei, 1999).

From this study, the incidence of PONV was 26% compared to the late study, where the incidences of PONV were around 20%-30% (Christian C. Apfel et al., 1999). Based on the comparison above, the incidence of PONV in RSUD Dr. Soetomo was still on a normal average.

This study consisted of 53 male patients and 47 female patients with PONV incidences based on gender were 11 PONV incidences on male and 15 PONV incidences of the female. This result showed that female have a 1.8 times higher risk of PONV than male does. The same result also was written by Apfel et al. (2012) that female (gender) is one of the strong predictors of PONV. The study before found that the risk of PONV increases 2.6 times higher in females than in the male (C.C. Apfel, Kranke, Eberhart, Roos, & Roewer, 2002). Even though the mechanism of higher PONV incidences in the female has not able to be explained.

The highest number of operation type that found in this study was ophthalmology operation and urology operation. Nevertheless, the highest incidences of PONV in this study were digestive operation and head and neck surgery operation, with the same amount of 4 PONV incidences each. The treatment done during the digestive operation stimulated the release of substance P and serotonin that led to vomiting response (C.C. Apfel et al., 2012). On the other hand, during the head and neck surgery operation, the passive blood flow from the oral cavity and nasal cavity to the stomach triggered PONV (Erkalp et al., 2014). Based on Sinclair's study (about Sinclair score), the type of operation is included in one of the predictor scores of PONV incidence. Meanwhile, based



QANUN MEDIKA

JURNAL KEDOKTERAN FKUM SURABAYA

<http://journal.um-surabaya.ac.id/index.php/qanunmedika>



on Apfel's study, the type of operation is not included as the predictor score of PONV as many of the types of operation led to bias score.

The accuracy of PONV score was tested using the Area Under the Curve (AUC) calculation and Receiver Operating Characteristic (ROC) curve method. This curve is the incision between the true positive rate (sensitivity) and the false-positive rate (specificity) from the score tested. The area with a score of 1.0 or 100% identified as the perfect sensitivity and specificity (Dahlan, 2014).

The diagnostic test of this study found that the sensitivity of Apfel, Koivuranta, and Sinclair score consecutively was 79.5%, 96.2%, and 73.1%. The specificity of Apfel, Koivuranta, and Sinclair score consecutively was 45.9%, 27% and 48.6%. While, based on the ROC curve, the AUC of Apfel, Koivuranta, and Sinclair score consecutively were 0.701, 0.628, and 0.619.

From the results above, the most sensitive PONV predictive score was the Koivuranta score with 96.2% and the most specific PONV predictive score was Sinclair score with 48.6%. However, based on the AUC, score Apfel (AUC 0.701) was the best PONV predictive score compared with the Koivuranta dan Sinclair score. From the ROC curve, it concluded that the Apfel score was better than Koivuranta and Sinclair score. Even though, from this study, the best AUC score was less than 0.8 which interpreted that Apfel, Kaoivuranta, and Sinclair score have a moderate level of trust to be used as PONV predictive score.

From another study, Apfel et al. (2002) found that the ROC of the Apfel score is higher than the Koivuranta score (0,68 dan 0,66). Another study was done by Pierre et al. (2002) (Pierre, Benais, & Pouymayou, 2002) also showed the significant difference between Apfel and Sinclair score, where Apfel has better accuracy than Sinclair (0,71 dan 0,64). These two studies

support this study result where Apfel has better specificity and sensitivity to be used as PONV predictive score.

Another result from this study was the cutoff point for each PONV predictor score from the ROC curve. This cutoff point is useful as a guide to classify whether a patient needs an antiemetic as PONV prophylactic or not. The cutoff point of Apfel, Koivuranta, and Sinclair score consecutively were 1 point, 1 point, and 4 points. So that, for patients who get a score higher than the cutoff point, the clinicians should consider giving PONV prophylactic agents as the risk of PONV incidence is higher on this patient.

CONCLUSION

The PONV incidence of post elective operation patients with general anesthesia aged 17 – 65 years old in GBPT RSUD Dr Soetomo without prophylactic was 26%. The highest PONV incidence was found in a patient with the digestive operation and head and neck surgery operation. From this study, it is recommended to use the Apfel score, as PONV predictor score, because the Apfel score was more accurate and had a simpler determination variable than Koivuranta and Sinclair score. This study also found that the cutoff point of Apfel score was 1 point, where it is suggested that the PONV prophylactic agent is given to a patient who gets more than 1 point of Apfel score. This study might not perfect, the researcher suggested a larger number of samples in the next study in order to produce more valid results of PONV's best predictor score.



REFERENCES

- Apfel, C.C., Heidrich, F. M., Jukar-Rao, S., Jalota, L., Hornuss, C., Whelan, R. P., ... Cakmakkaya, O. S. (2012). Evidence-based analysis of risk factors for postoperative nausea and vomiting †. *British Journal of Anaesthesia*, *109*(5), 742–753. <https://doi.org/10.1093/bja/aes276>
- Apfel, C.C., Kranke, P., Eberhart, L. H. J., Roos, A., & Roewer, N. (2002). Comparison of predictive models for postoperative nausea and vomiting. *British Journal of Anaesthesia*, *88*(2), 234–240. <https://doi.org/10.1093/bja/88.2.234>
- Apfel, Christian C., Läärä, E., Koivuranta, M., Greim, C.-A., & Roewer, N. (1999). A Simplified Risk Score for Predicting Postoperative Nausea and Vomiting. *Anesthesiology*, *91*(3), 693. <https://doi.org/10.1097/00000542-199909000-00022>
- Butterworth, J.F., Mackey, D.C., Wasnick, J.D., Morgan, G.E., Mikhail, M.S., Morgan, G.E. (2018). *Morgan and Mikhail's clinical anesthesiology* (6th ed.). The McGraw-Hill Companies.
- Dahlan, S. (2014). *Statistik untuk kedokteran dan kesehatan* (6th ed.). Jakarta: Salemba Medika.
- Erkalp, K., Kalekoglu Erkalp, N., Sevdi, M. S., Korkut, A. Y., Yeter, H., Ege, S. S., ... Erden, V. (2014). Gastric Decompression Decreases Postoperative Nausea and Vomiting in ENT Surgery. *International Journal of Otolaryngology*, *2014*, 1–5. <https://doi.org/10.1155/2014/275860>
- Habib, A. S., Chen, Y.-T., Taguchi, A., Henry Hu, X., & Gan, T. J. (2006). Postoperative nausea and vomiting following inpatient surgeries in a teaching hospital: a retrospective database analysis. *Current Medical Research and Opinion*, *22*(6), 1093–1099. <https://doi.org/10.1185/030079906X104830>
- Koivuranta, M., Läärä, E., Snäre, L., & Alahuhta, S. (1997). A survey of postoperative nausea and vomiting. *Anaesthesia*, *52*(5), 443–449. <https://doi.org/10.1111/j.1365-2044.1997.117-az0113.x>
- Pierre, S., Benais, H., & Pouymayou, J. (2002). Apfel's simplified score may favourably predict the risk of postoperative nausea and vomiting. *Canadian Journal of Anesthesia/Journal Canadien d'anesthésie*, *49*(3), 237–242. <https://doi.org/10.1007/BF03020521>
- Sinclair, D. R., Chung, F., & Mezei, G. (1999). Can postoperative nausea and vomiting be predicted? *Anesthesiology*, *91*(1), 109–118. <https://doi.org/10.1097/00000542-199907000-00018>
- Tramèr, M. R., & Fuchs-Buder, T. (1999). Omitting antagonism of neuromuscular block: effect on postoperative nausea and vomiting and risk of residual paralysis. A systematic review. *British Journal of Anaesthesia*, *82*(3), 379–386. <https://doi.org/10.1093/bja/82.3.379>