Pharmacogenomics of postoperative nausea and vomiting: Multifactorial all the way

Dear Editor,

Postoperative nausea and vomiting (PONV) is a common phenomenon after receiving an anesthetic for surgery. Currently the prevalence of PONV has been estimated to be 27.7% and has been found to be especially more common among patients in European countries.[1] The patient-related factors that predispose to PONV are female gender, non-smokers, obesity, history of PONV, motion sickness or migraine, and younger age. Anesthesia related factors are the use of opioids, use of nitrous oxide, use of inhalational anesthetics. Certain surgeries that predispose to a higher incidence of PONV are abdominopelvic surgeries, middle ear surgeries, laparoscopy, surgeries in pediatric patients.[2]

Anesthesiologist performs risk stratification for PONV using Apfel score. A patient with an Apfel score of more than 2 is considered high risk for PONV and deserves prophylaxis.[3] Although the causes are considered multifactorial, researchers have long considered genetic susceptibility as one of the important causes precipitating PONV. Knowing a genetic susceptibility will guide researchers to develop specific regimens for PONV prophylaxis rather than using a cocktail of medications.

Researchers have identified two single-nucleotide polymorphisms (SNPs) namely the CHRM3 rs2165870 and the KCNB2 rs349358 being significantly associated with PONV. In a systematic review by Klenke *et al*., the authors established a major influence of two afore-mentioned SNPs on PONV, in the Caucasian population.[4] Based on the analysis by reviewing 14 published articles, the authors mentioned that both SNPs were identified in a genome-wide association study (GWAS). GWAS helps in better understanding of the association between common genetic variants and risk of disease.[5]

The role of ethnicity influencing PONV could be the differences in cultural and pharmacogenetic variations across various ethnicity.[6] As varies genetic polymorphisms exist between different races, various factors like efficacy of 5HT3-receptor antagonists and its receptor genes, polymorphisms in cytochrome P450 system, dopamine receptors, and opioid efficacy due to genetic polymorphisms of the OPRM1 A118G mu-opioid receptor gene is interlinked with the incidence of PONV along with Apfel score.

Klenke *et al*. retrospectively analyzed data of 472 patients undergoing elective surgeries. They investigated various

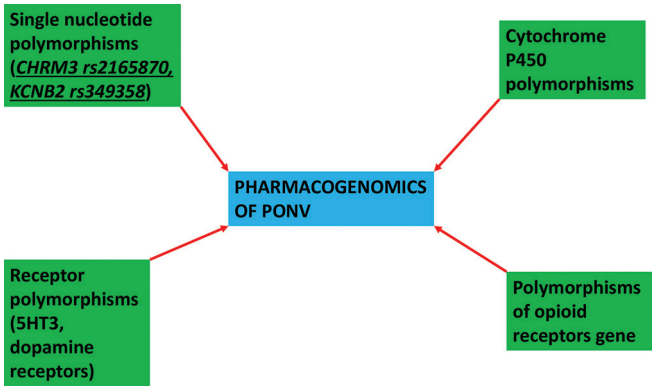

Figure 1: Figure showing various factors involved in the pharmacogenomics of postoperative nausea/vomiting

SNPs, their association with PONV and established a genetic score based on the analyzed results.[7] The authors concluded that KCNB2 rs349358 and CHRM3rs2165870 SNP are independent predictors for PONV. However, the limitations of this study were the retrospective nature of study, inadequate analysis of other SNPs like that of dopamine, serotonin, and CYP2D6 gene.

Figure 1 depicts the various factors involved in pharmacogenomics of PONV. Apfel score has been proven in several review articles as a useful tool for identifying patients at risk for PONC. However, if patients have a score of less than 2 and still experience PONV, there should be clinical suspicion of genetic aberration at some level. It is not feasible to screen all patients for polymorphisms. However, if any patient with Apfel score less than 2 experiences difficulty to treat PONV, such patients should be alerted and they should be told to inform the attending anesthesiologist involved in future surgeries about the experience and to consider aggressive, multimodal PONV prophylaxis and management. Combination of anti-emetics should be used with caution, especially the one with a propensity for extrapyramidal side effects and arrhythmias.

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Conflicts of interest
There are no conflicts of interest.

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