Original Research Article

Association of postoperative complications with anemic women underwent gynecologic and obstetric surgeries

ABSTRACT

Objective: Preoperative anemia among women has been recognized as a risk factor for adverse postoperative complications following gynecologic and obstetric surgeries. Therefore, this retrospective analysis was conducted to assess the association of postoperative complications and comorbidities with anemia in women underwent gynecologic and obstetric surgeries.

Methodology: A retrospective study was carried out in the Department of Obstetrics and Gynecology of Hamdard hospital, Karachi by using non-probability, purposive sampling technique. A total of 200 women were chosen for this study wherein 89 women were anemic and 111 were non-anemic. Duration of the study was one year from July 2018 – June 2019. Adult female patients of 18 to 65 years having elective or emergency surgical procedure were included. Chi square test was applied to evaluate the association between religion, socioeconomic status, comorbidities, and postoperative complications with anaemia.

Results: The study results showed that the mean age of studied women was found 32.04±7.79 years and mean hospital stay was reported 3.38±1.08 days. Regarding Comorbidities, 89(100.0%) non diabetic were anemic while 6(5.4%) diabetic and 105(94.6%) non-diabetic were non-anemic with a significant association of diabetes with anemia ($p=0.026$). Regarding postoperative complications, significant association of fever was found with anemia ($p<0.001$). Moreover, 71(79.8%) anemic and 39(35.1%) non-anemic reported postoperative nausea and vomiting with a significant association between them ($p<0.001$). As far as wound infection is concerned, significant association of wound infection was observed with anemia ($p=0.020$).

Conclusion: This study concluded that postoperative fever, nausea and vomiting were observed significantly higher in anemic women than non-anemic underwent gynecologic and obstetric surgeries. Wound infection was also significantly associated with anemia.

Therefore, educational and nutritional policies should be planned to persuade women to use iron-rich diet in order to decrease the burden on patients facing these complications.

Keywords: Anemia, postoperative nausea and vomiting, fever, wound infection.

INTRODUCTION

Globally, Anemia remains an important public health dilemma disturbing 24.5–35.0% of Women of Reproductive Age (WRA); particularly low-income nations are more affected.[1] When hemoglobin (Hb) level drops less than 12.0 g/dl that is a recognized cut-off value among Women of Reproductive Age (WRA) lead to develop anemia eventually impairs the ability of the blood to carry oxygen to the body. [2–4] Worldwide, approximately half a billion of WRA are affected by anemia. About two-thirds of WRA with anemia are affecting lower and middle socioeconomic nations.[5, 6] In South-East Asian countries, 41.9% of WRA are anemic [6]. On contrary, in developed countries such as Europe only 2–5% of WRA are anemic [7]. Similar to other lower and middle socioeconomic nations, there is a huge trouble of anemia in Pakistan [8]. Several researches have predicted that 41.7% - 77.0% of women of child bearing age are affected by anemia in Pakistan. [8, 9] Prevalence of Anemia is more in the rural areas of Pakistan, where it exists frequently in severe condition and associated with adverse consequences like postpartum bleeding, stillbirth or preterm delivery and low birth weight newborns.[10]

In pregnancy state, physiological hemodilution decreases hemoglobin level in the time period of first trimester, achieves a low point in the second trimester prior to increasing once again in the third trimester.[11]The hemoglobin concentrations continue to increase in puerperium and attain a peak in the postpartum immediately owing to diuresis-induced resolution of anemia induced by pregnancy along with redistribution of constricting uterine circulation to the systemic circulation.[12] Non-pregnant state recovers anemia in post-delivery by 12 weeks.[13] World Health Organization (WHO) stated that hemoglobin levels related to pregnancy are used to classify anemia in pregnancy; specifically, hemoglobin level 10–10.9 g/dl regarded as mild anemia, 7–9.9 g/dl regarded as moderate, and < 7 g/dl regarded as severe anemia.[14]

Maternal anemia enhances the probability of perinatal mortality and morbidity such as the danger of miscarriages, stillbirths, preterm delivery, and low birth weight babies,[15] trouble of depression and agitation,[16] and adverse mother-infant relations.[17] Wound healing is

impaired by postpartum anemia that eventually raises the probability of readmission and/or lengthened hospitalization period, and increases the expenditure of health care for families.[18] Peripartum anemia is a critical health concern owing to rising rate of caesarean section in low-income countries.[19]

Postoperative complications can cause by factors that could be related to either patient or surgeon. In the intraoperative state, inflamed bowel, ascites, distorted anatomy, former surgery, endometriosis, carcinomas, and pelvic inflammatory disease can raise the chances of injury. The patient's age, weight, comorbidities, compliance level, hygienic condition, nutritional and functional status may provide evidence to be directly or indirectly contributory factor of complications. Likewise, the sterilization of the operation theatre and hygiene of operating workers, aseptic conditions, and surgical inaccuracy can also leads to develop these complications.[20]

Postoperative nausea and vomiting (PONV) is a frequent complication of anesthesia and surgery. It is recognized as the most usual reason of morbidity following anesthesia[21] and has important effects on patient contentment and expenditure.[22] Regardless of advancement in anti-emetic remedy, the occurrence of PONV is apparently 20 – 30% and rise to around 70% of those with definite risk factors.[23] These risk factors comprise of female gender and middle ear, breast, gynecologic and obstetric surgery.[24]

Globally, incidence of cesarean section has increased over the past few years that is predicted up to 41% in China and USA.[25,26] It is related to morbidity and mortality includes surgical site infection. This is estimated to be the most frequent infection in community hospital scenario.[27] In earlier researches carried out across Pakistan, it is reported that 9.1% to 24.3% cases are affected by wound infection.[28,29] SSI in Post cesarean section leads to raise maternal morbidity for instance longer hospital stay, repetitive surgical interventions, extended utilization of wide-ranging antibiotics, impaired wound healing, danger of hysterectomy as well as physical, financial, psychological crisis and on quality of life.[30] Surgical site infections are less reportedly in developed countries than developing countries. In developing countries, some predisposing factors lead to high SSI rate includes poverty, starvation, anemia, shortage of facilities, insanitary conditions, fatness and diabetes mellitus.[31]

These postoperative complications can occasionally cause legal troubles to the surgeon. There is scarce data available in Pakistan regarding postoperative complications following

gynecologic and obstetric surgeries. Appropriate management is imperative to avoid these complications. Therefore, the aim of this retrospective evaluation was to determine the association of postoperative complications and coexisting illnesses with anemic women underwent gynecologic and obstetric surgeries.

METHODOLOGY

A retrospective study was carried out in the Department of Obstetrics and Gynecology of Hamdard hospital, Karachi by using non-probability, purposive sampling technique after taking ethical approval from the ethical review board of Hamdard University, Karachi. Study was performed over duration of one year from July 2018 – June 2019. A total of 200 women were chosen for this study wherein 89 women were anemic and 111 were non-anemic. Adult female patients of 18 to 65 years having elective or emergency surgical procedure were included in the study whereas patients admitted due to minor pathology, pathological fractures, other benign diseases, patients who at the same time having any other pathology at the time of admission, medical or obstetric complications, inter-operative or immediate major postoperative complications (for example blood transfusion needed for any reason, oral fluid intolerance) were excluded from the study.

Data was collected by using prepared standardized Performa. Retrospective Data was gathered from departmental records. Demographic details like age, hospital stay, religion and socioeconomic status were documented. Type of comorbidities (obesity and diabetes mellitus) and postoperative complications were also documented.

Data was analysed by using SPSS version-16. Mean standard deviation was estimated for age and hospitalization stay. Frequencies and percentages were calculated for comorbidities (obesity and diabetes mellitus) and postoperative complication. Chi square test was applied to evaluate the association between religion, socioeconomic status, comorbidities, and postoperative complications with anaemia. A p-value less than 0.05 was taken as statistical significant.

RESULTS

A total of 200 women wherein 89(100.0%) were anemic and 111(100.0%) were non-anemic who underwent gynecologic and obstetric surgeries were selected for this study their mean age was found 32.04±7.79 years and mean hospital stay was reported 3.38±1.08 days, as shown in Table 1.

As far as distribution of religion with anemia is concerned, 78(87.6%) Muslims, 11(12.4%) Hindus were anemic while 104(93.7%) Muslims, 4(3.6%) Hindus, and 3(2.7%)

Christian were non-anemic with the significant association between them (p=0.022). Furthermore, Nationality showed 89(100.0%) Pakistani were anemic whereas 111(100.0%) were non-anemic. Socioeconomic status showed 3(3.4%) belonged to lower class, 55(61.8%) belonged to middle class and 31(34.8%) belonged to upper class were anemic. On the other hand, 8(7.2%) belonged to lower class, 62(55.9%) belonged to middle class and 41(36.9 %) belonged to upper class were non-anemic with an insignificant difference between socioeconomic status and anemia (p=0.432), as shown in Table 2.

Regarding Comorbidities, 7(7.9%) obese and 82(92.1%) non-obese were anemic whereas 19(17.1%) obese and 92(82.9%) non-obese were non-anemic with an insignificant association between them (p=0.053). 89(100.0%) non diabetic were anemic and 6(5.4%) diabetic and 105(94.6%) non-diabetic were non-anemic with a significant association of diabetes with anemia (p=0.026). Regarding postoperative complications, significant association of fever was found with anemia (p<0.001). Moreover, 71(79.8%) anemic and 39(35.1%) non-anemic was reported postoperative nausea and vomiting with a significant association between them (p<0.001). As far as wound infection is concerned, significant association of wound infection was observed with anemia (p=0.020). Additionally, an insignificant association of Paralytic lleus (p=0.118), abdominal distention (p=0.413), wound dehiscence (p=0.203), bleeding per vagina (p=0.929), postoperative gastritis (p=0.366) was observed with anemia, as shown in Table 3.

Table 1: Mean Demographic characteristics of patients. (n=200)

Variable	**Mean±SD**
Age (years)	32.04±7.79
Hospital Stay Day	3.38±1.08

Table 2: Association of religion and socioeconomic status with anemia.

Variable		**Anemia**		**p-value**
		Yes n(%)	**No n(%)**	
Religion	**Islam**	78(87.6%)	104(93.7%)	0.022

	Hindu	11(12.4%)	4(3.6%)	
	Christian	0(0.0%)	3(2.7%)	
Nationality	**Pakistani**	89(100.0**%)**	111(100.0%)	---
Socio Economic Status Household income	**Lower Class**	3(3.4%)	8(7.2%)	0.432
	Middle Class	55(61.8%)	62(55.9%)	
	Upper Class	31(34.8%)	41(36.9%)	

Table 3: Association of comorbidities and postoperative complications with anemia.

Variable		**Anemia**		**p-value**
		Yes n(%)	**No n(%)**	
Co-Morbid Obesity	**Yes**	7(7.9%)	19(17.1%)	0.053
	No	82(92.1%)	92(82.9%)	
Co-Morbid Diabetes	**Yes**	0(0.0%)	6(5.4%)	0.026
	No	89(100.0%)	105(94.6%)	
Fever	**Yes**	45(50.6%)	24(21.6%)	<0.001
	No	44(49.4%)	87(78.4%)	
Postoperative Nausea and Vomiting	**Yes**	71(79.8%)	39(35.1%)	<0.001
	No	18(20.2%)	72(64.9%)	
Paralytic Ileus	**Yes**	0(0.0%)	3(2.7%)	0.118
	No	89(100.0%)	108(97.3%)	
Abdominal Distention	**Yes**	12(13.5%)	11(9.9%)	0.431
	No	77(86.5%)	100(90.1%)	
Wound Dehiscence	**Yes**	0(0.0%)	2(1.8%)	0.203
	No	89(100.0%)	109(98.2%)	
Wound Infection	**Yes**	8(9.0%)	2(1.8%)	0.020
	No	81(91.0%)	109(98.2%)	
Bleeding Per Vagina	**Yes**	3(3.4%)	4(3.6%)	0.929
	No	86(96.6%)	107(96.4%)	

Post Operative Gastritis	**Yes**	5(5.6%)	10(9.0%)	0.366
	No	84(94.4%)	101(91.0%)	

DISCUSSION

Postoperative complications such as wound infection, wound dehiscence, fever, nausea and vomiting are the serious complications associated with obstetrics and gynecologic surgeries that are more aggravated by the presence of lower hemoglobin level and coexisting illnesses. With the increasing incidence of cesarean section all over the world its intrinsic risks are also predicted to be on the rise including SSI, thus it has a clinical importance.[31] This study demonstrated the post operative complications reported with the associated comorbidities in the obstetrics and gynecologic surgeries.

One research included 145 patients and determined the frequency and association of surgical site infection with comorbidities and factors accountable for it after urgent cesarean section. Mean age of the studied patients was found 30.93 years [32] that was in harmony with further research.[31] The present study was consistent to some extent with the above reported studies and revealed that mean age of the studied patients was found to be 32.04±7.79 years.

Similarly, one research reported that 35 patients found high rate of development of surgical site infection and 58.6% patients reported anemia who progressed SSI and showed significant association.[32] The incidence of anemia in obstetric populace is extraordinarily elevated in emergent nations. It has an unfavorable effect on the wound healing owing to lower supply of oxygen to tissue therefore may encourage the progression of wound infection. [32] One study conducted at Novo Scotia, observed 2.7%, Surgical site infection rate[33] Another study from Thailand observed 5.9% rate of wound infection, [34] 48% reported from Tanzania study [35]. Furthermore, a research by Ghazi et al found 82% patients were anemic who had emergency Cesarean section.[36] As far as the

present study is concerned, wound infection was observed at low rate but significantly associated with anemia. (p=0.020).

Concerning anemia, one of the studies demonstrated that a higher hemoglobin concentration is associated with a lower SSI risks. Moreover, it was also reported that patients suffered from moderate anemia had a higher chances to develop wound infection. [37] This increasing the possibility of wound infection by compromising the action of the macrophages and prevents the progression of the wound healing by decreasing collagen synthesis. Therefore, a less stable scar develops and encourages wound dehiscence and infection.[38] And this is endorsed by other studies as well. [39,40] The present study was also supported to above mentioned researches and revealed that frequency of wound infection was significantly associated with anemia (p=0.020) thereby proving anemic women had more chances to develop wound infection than non-anemic.

Another research by Harvey observed a total prevalence of postoperative nausea and vomiting (PONV) was 2.9% in the recovery room in Guyana that was significantly lower than Caucasian people.[41] The present study was not in accordance with the above reported research and proved that postoperative nausea and vomiting was observed in most of the anemic women 71(79.8%) and proving significantly higher (p<0.001) cases reported in anemic than non-anemic women.

Similarly, one research demonstrated the significant relationship between the incidence of complications and parameters such as age, surgical approach, parity, time period of surgery, preoperative interval of hospital stays, in addition to blood transfusion preoperatively. On the other hand, no significant relationship was reported with regard to earlier abdominal surgeries, comorbidities, menopausal status, and BMI.[21] One research by Gevariya et al. have revealed no significant association between surgical complications and age and parity.[42] The present study was not supported the above reported studies because we did not find the association between postoperative complication with age, parity, approach of surgery, duration of surgery and interval of hospital stays.

CONCLUSION

This study concluded that postoperative fever, nausea and vomiting were observed significantly higher in anemic women than non-anemic underwent gynecologic and obstetric surgeries. Wound infection was also significantly associated with anemia. Therefore, educational and nutritional policies should be planned to persuade women to use iron-rich diet in order to decrease the burden on patients facing these complications.

Ethical Approval

Ethical Approval was taken from the ethical review board of Hamdard University, Karachi.

Consent

As per international standard or university standard, patients' written consent has been collected and preserved by the author(s).

REFERENCES

1. WHO. The global prevalence of anaemia in 2011. Geneva: World Health Organization; 2015.
2. World Health Organization. Haemoglobin concentrations for the diagnosis of anaemia and assessment of severity. 2011.
3. Cappellini MD, Motta I. Anemia in Clinical Practice-Definition and Classification: Does Hemoglobin Change With Aging? Semin Hematol. 2015 Oct;52(4):261-9. doi: 10.1053/j.seminhematol.2015.07.006.
4. Beutler E, Waalen J. The definition of anemia: what is the lower limit of normal of the blood hemoglobin concentration? Blood. 2006 Mar 1;107(5):1747-50. doi: 10.1182/blood-2005-07-3046.
5. Ouédraogo S, Koura GK, Bodeau-Livinec F, Accrombessi MM, Massougbodji A, Cot M. Maternal anemia in pregnancy: assessing the effect of routine preventive measures in a malaria-endemic area. Am J Trop Med Hyg. 2013 Feb;88(2):292-300. doi: 10.4269/ajtmh.12-0195.
6. World Health Organization.The global prevalence of anaemia in 2011. Geneva: World Health Organization; 2015. 2017.

7. Milman N, Taylor CL, Merkel J, Brannon PM. Iron status in pregnant women and women of reproductive age in Europe. Am J Clin Nutr. 2017 Dec;106(Suppl 6):1655S-1662S. doi: 10.3945/ajcn.117.156000.

8. Ministry of National Services Regulation and Coordination (MoNHSR&C) GoP. National Nutrition Survey. 2018.

9. Baig-Ansari N, Badruddin SH, Karmaliani R, Harris H, Jehan I, Pasha O, et al. Anemia prevalence and risk factors in pregnant women in an urban area of Pakistan. Food Nutr Bull. 2008 Jun;29(2):132-9. doi: 10.1177/156482650802900207.

10. Parks S, Hoffman MK, Goudar SS, Patel A, Saleem S, Ali SA, et al. Maternal anaemia and maternal, fetal, and neonatal outcomes in a prospective cohort study in India and Pakistan. BJOG. 2019 May;126(6):737-743. doi: 10.1111/1471-0528.15585.

11. Chandra S, Tripathi AK, Mishra S, Amzarul M, Vaish AK. Physiological changes in hematological parameters during pregnancy. Indian J Hematol Blood Transfus. 2012 Sep;28(3):144-6. doi: 10.1007/s12288-012-0175-6.

12. Akinlaja O. Hematological changes in pregnancy-the preparation for intrapartum blood loss. Obstet Gynecol Int J. 2016;4(3):00109. DOI:10.15406/ogij.2016.04.00109

13. Chauhan G, Tadi P. Physiology, Postpartum Changes. 2021 Nov 21. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2022 Jan–. PMID: 32310364.

14. WHO. Haemoglobin concentrations for the diagnosis of anaemia and assessment of severity: World Health Organization; 2011.

15. Smith C, Teng F, Branch E, Chu S, Joseph KS. Maternal and Perinatal Morbidity and Mortality Associated With Anemia in Pregnancy. Obstet Gynecol. 2019 Dec;134(6):1234-1244. doi: 10.1097/AOG.0000000000003557.

16. Corwin EJ, Murray-Kolb LE, Beard JL. Low hemoglobin level is a risk factor for postpartum depression. J Nutr. 2003;133(12):4139–42.

17. Perez EM, Hendricks MK, Beard JL, Murray-Kolb LE, Berg A, Tomlinson M, et al. Mother-infant interactions and infant development are altered by maternal iron deficiency anemia. J Nutr. 2005;135(4):850–5.

18. Breymann C, Honegger C, Holzgreve W, Surbek D. Diagnosis and treatment of iron-deficiency anaemia during pregnancy and postpartum. Arch Gynecol Obstet. 2010;282(5):577–80.

19. Atuheire EB, Opio DN, Kadobera D, Ario AR, Matovu JK, Harris J, et al. Spatial and temporal trends of cesarean deliveries in Uganda: 2012–2016. BMC Pregnancy Childbirth. 2019;19(1):132. doi: 10.1186/s12884-019-2279-6.

---

20. Bahadur A, Mundhra R, Kashibhatla J, Chawla L, Ajmani M, Sharma S, et al. Intraoperative and Postoperative Complications in Gynaecological Surgery: A Retrospective Analysis. Cureus. 2021 May 7;13(5):e14885. doi: 10.7759/cureus.14885.
21. Gibbison B, Spencer R. Postoperative nausea and vomiting. Anaesthesia and Intensive Care Medicine. 2009;10(12):597–601.
22. Stadler M, Bardiau F, Seidel L, Albert A, Boogaerts JG. Difference in risk factors for postoperative nausea and vomiting. Anesthesiology. 2003 Jan;98(1):46-52. doi: 10.1097/00000542-200301000-00011.
23. Fernández-Guisasola J, Gómez-Arnau JI, Cabrera Y, del Valle SG. Association between nitrous oxide and the incidence of postoperative nausea and vomiting in adults: a systematic review and meta-analysis. Anaesthesia. 2010 Apr;65(4):379-87. doi: 10.1111/j.1365-2044.2010.06249.x.
24. Mraovic B, Simurina T, Sonicki Z, Skitarelic N, Gyan TJ. The dose response of nitrous oxide used in postoperative nausea in patients undergoing gynecologic laparoscogric Surgery – A preliminary study. Anesth Analg. 2008 Sep;107(3):818–23.
25. Zhang J, Liu Y, Meikle S, Zheng J, Sun W, Li Z. Cesarean delivery on maternal request in southeast China. Obstet Gynecol. 2008 May;111(5):1077-82. doi: 10.1097/AOG.0b013e31816e349e.
26. Betrán AP, Merialdi M, Lauer JA, Bing-Shun W, Thomas J, Van Look P, et al. Rates of caesarean section: analysis of global, regional and national estimates. Paediatr Perinat Epidemiol. 2007 Mar;21(2):98-113. doi: 10.1111/j.1365-3016.2007.00786.x.
27. Lakhan P, Doherty J, Jones M, Clements, Archie. A systematic review of maternal intrinsic risk factors associated with surgical site infection following caesarean sections. Health infect. 2010;15(2):35-41. https://doi.org/10.1071/HI10001.

28. Shree R, Park SY, Beigi RH, Dunn SL, Krans EE. Surgical Site Infection following Cesarean Delivery: Patient, Provider, and Procedure-Specific Risk Factors. Am J Perinatol. 2016 Jan;33(2):157-64. doi: 10.1055/s-0035-1563548.
29. Khawaja NP, Yousaf T, Tayyeb R. Analysis of caesarean delivery at a tertiary care hospital in Pakistan. J Obstet Gynaecol. 2004 Feb;24(2):139-41. doi: 10.1080/01443610410001645415.
30. Chu K, Maine R, Trelles M. Cesarean section surgical site infections in sub-Saharan Africa: a multi-country study from Medecins Sans Frontieres. World J Surg. 2015 Feb;39(2):350-5. doi: 10.1007/s00268-014-2840-4.
31. Zejnullahu VA, Isjanovska R, Sejfija Z, Zejnullahu VA. Surgical site infections after cesarean sections at the University Clinical Center of Kosovo: rates, microbiological profile and risk factors. BMC Infect Dis. 2019;19(1):752. doi:10.1186/s12879-019- 4383-7.
32. Fatima N, Ellahi A, Shawita. Surgical site infection and factors responsible for it after emergency cesarean section J Surg Pakistan. 2020;25 (1):27-30. Doi:10.21699/jsp.25.1.7.
33. Ketcheson F, Woolcott C, Allen V, Langley JM. Risk factors for surgical site infection following cesarean delivery: a retrospective cohort study. CMAJ. 2017; 5(3):ES46.
34. Assawapalanggool S, Kasatpibal N, Sirichotiyakul S, Arora R, Suntornlimsiri W. Risk factors for cesarean surgical site infections at a Thai-Myanmar border hospital. Am J Infect Control. 2016;44(9):990- 5. doi:10.1016/j.ajic.2016.01.031.
35. De Nardo P, Gentilotti E, Nguhuni B, Vairo F, Chaula Z, Nicastri E, et al. Post-cesarean section surgical site infections at a Tanzania tertiary hospital: a prospective observational study. J Hosp Infect. 2016 Aug;93(4):355-9. doi: 10.1016/j.jhin.2016.02.021.
36. Ghazi A, Karim F, Muhammad A, Ali T. Maternal morbidity in emergency versus elective cesarean section at a tertiary care hospital. J Ayub Med Coll. 2012; 24(1):10-3.
37. Yerba K, Failoc-Rojas V, Zeña-Ñañez S, Valladares-Garrido M. Factors Associated with Surgical Site Infection in Post-Cesarean Section: A Case-Control Study in a Peruvian Hospital. Ethiop J Health Sci. 2020 Jan;30(1):95-100. doi: 10.4314/ejhs.v30i1.12.
38. Gordillo GM, Sen CK. Revisiting the essential role of oxygen in wound healing. Am J Surg. 2003 Sep;186(3):259-63.doi: 10.1016/s0002-9610(03)00211-3.

39. Wodajo S, Belayneh M, Gebremedhin S. Magnitude and Factors Associated with Post-Cesarean Surgical Site Infection at Hawassa University Teaching and Referral Hospital, Southern Ethiopia: A Cross-sectional Study. Ethiop J Health Sci. 2017 May;27(3):283–290.
40. Gelaw KA, Aweke AM, Astawesegn FH, Demissie BW, Zeleke LB. Surgical site infection and its associated factors following cesarean section: a cross sectional study from a public hospital in Ethiopia. Patient Saf Surg. 2017;12(11):18.
41. Harvey AB. Post operative nausea and vomiting in the recovery room - A report from Gugana. West Indian Med J. 2001 Mar;50(1):31–6.
42. Gevariya R, Oza H, Doshi H, Parikh P: Epidemiology, risk factors and outcome of complications in obstetric and gynecological surgeries—a tertiary center experience from western India. J US-China Med Sci. 2015, 12:45-52. DOI:10.17265/1548-6648/2015.02.001.