

Assessing risk factors of bypass graft surgery through the implementation of Bayesian and non-Bayesian methodologies

Dler Hussein Kadir ^{a,b}, Azhin Mohammed Khudhur ^a

^a Department of Statistics and Informatics, College of Administration and Economics, Salahaddin University-Erbil, Kurdistan Region - F.R., Iraq

^b Department of Business and Administration, Cihan University-Erbil, Kurdistan Region, Iraq

Received 1 January 2024, Revised 5 April 2024, Accepted 9 April 2024, Available online 10 April 2024, Version of Record 12 April 2024.

 What do these dates mean?

 Check for updates

Show less 

 Add to Mendeley  Share  Cite

<https://doi.org/10.1016/j.rineng.2024.102129>

[Get rights and content](#)

Under a Creative Commons license

 open access

Highlights

- **Multiple logistic regression (MLR)** analysis was harnessed to discern the determinants of Bypass Graft surgery.
- There is some autocorrelation among estimated parameters.
- **Bayesian logistic regression analysis** highlighted Age, **WBC**, and **MCH**.
- There are unearthed disparate outcomes between the classical and Bayesian logistic models.

Abstract

The aim of this research is to determine the key **risk factors** that influence the need for **Bypass Graft** surgery (BGS). A cohort of one hundred adult patients underwent **coronary angiography** operations at the Erbil Cardiac Center from January 2016 to December 2020. **Multiple logistic regression (MLR)** analysis was used to identify the determinants of BGS. Upon detailed statistical analysis, a significant association with BGS was found for **several variables**, including Age, **BMI**, **Eosinophil**, **WBC**, **DBP**, **HbA1c**, **MCH**, Blood Sugar, **PLT**, and T3. It was found that the significant variables contributing the most to predicting the likelihood of **Bypass Graft** surgery through **Bayesian logistic regression analysis** were Age, **WBC**, and **MCH**. These variables were identified as the pivotal risk factors associated with the probability of undergoing BGS. Age, **DBP** and Blood Sugar had minimal influence on the likelihood of Bypass surgery. However, for each unit increase in **WBC**, the odds of surgery reduced by 38%, and for **MCH**, the odds reduced by 19%. **DBP** and Blood Sugar had little effect on Bypass surgery (Bayesian odds ratio close to 1). This study revealed that Bayesian **logistic models** offer superiority over classical logistic models. The Bayesian-based models provide more **accurate predictions** by incorporating informative prior distributions. To improve the accuracy and **generalizability** of the findings, future research should consider a larger **sample size** and incorporate informative prior distributions within the **Bayesian framework**. Also, **machine learning algorithms** can offer new insights into BGS outcomes by considering various variables and assessing model sensitivity.