

A clinician-friendly dynamic nomogram to evaluate the obesity paradox in colorectal cancer survival outcomes

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Background and Aim

Translational statistics bridge the gap between biostatistics and clinical research, enhancing the communication of research findings. In colorectal cancer (CRC) research, nomograms—graphical models that incorporate multiple independent prognostic factors—serve as powerful tools. This study focuses on developing a dynamic nomogram, an easy-to-use online tool designed for clinicians to evaluate the obesity paradox in survival outcomes for CRC patients.

Method

We conducted a retrospective analysis using prospectively collected data from the Cabrini Monash colorectal neoplasia database, focusing on patients who underwent colorectal cancer surgery between January 2010 and December 2022. Additional follow-up data were gathered until December 2023. Key variables collected included sex, age at diagnosis, tumour location, and survival outcomes. A model selection process was performed, incorporating interactions between these factors and continuous BMI. Subsequently, prognostic dynamic nomograms were developed using these variables with the R package DynNom to create an online tool.

Results

The study included 5,446 CRC patients, with an overall mortality rate of 4.6 per 100 individuals (95% CI: 4.2-4.9) and a relapse-free mortality rate of 4.9 per 100 individuals (95% CI: 4.5-5.3). The 5-year overall survival and relapse-free survival rates were 0.81 (95% CI: 0.79-0.82) and 0.80 (95% CI: 0.78-0.81), respectively. The dynamic nomogram, incorporating selected risk factors, serves as an accessible online tool for clinical prognosis prediction (Figure 1) and is available at: [https://fvx0de-mohammad-asghari0jafarabadi.shinyapps.io/DynNom_BMI/].

Overall survival nomogram

bmi

13

13 18 23 28 33 38 43 48 53 58 60

sex

Female

age_cat

<50

tumour_site2

left_colon

☐ Predicted Survival at this Follow Up:

☒ Alpha blending (transparency)

Predict

Press Quit to exit the application

Quit

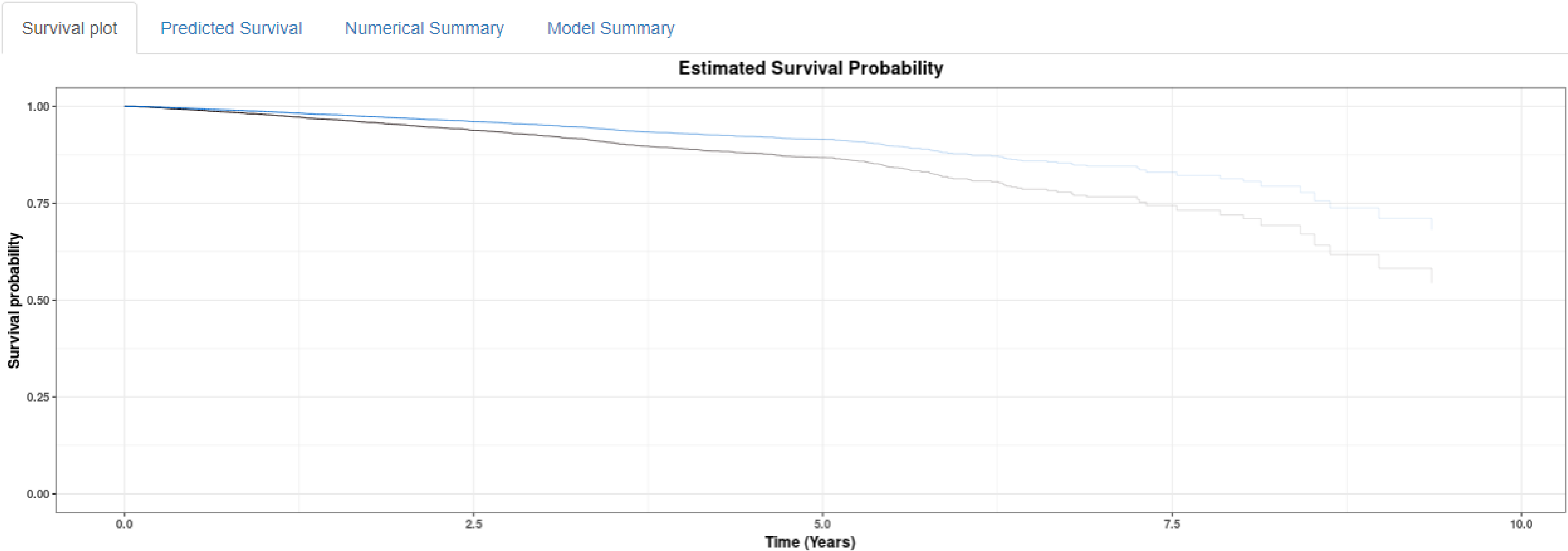


Figure 1: Overall survival probability online calculator available at: https://fvx0de-mohammad-asghari0jafarabadi.shinyapps.io/DynNom_BMI/

Conclusion

This study showcases the power of advanced statistical tools in uncovering key risk factors underlying the obesity paradox in colorectal cancer survival outcomes. The clinician-friendly online dynamic nomogram developed in this research provides valuable insights for clinicians, enhancing understanding of the obesity paradox and refining prognostic accuracy. This tool represents a significant step toward personalised healthcare practices, offering a tailored approach to the management and care of CRC patients.

References

Jalali A, Alvarez-Iglesias A, Roshan D, Newell J. Visualising statistical models using dynamic nomograms. *PLoS one*. 2019;14(11):e0225253.