BINARY LOGISTIC REGRESSION ANALYSIS REPORT

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1 Overview

This report presents findings from a logistic regression analysis aimed at exploring the relationship between predictor variables and the likelihood of disease occurrence in patients post-transplant.

2 Introduction

The onset of chronic kidney disease (CKD) following liver transplantation is a significant complication that severely impacts patient survival. Pediatric patients who undergo liver transplantation require long-term monitoring, as impaired renal function is a recognized issue in this population. Genetic polymorphisms in genes such as CYP3A5 and MDR-1 have been linked to renal dysfunction in liver transplant recipients. Despite effective immunosuppressive regimens, acute rejection after orthotopic liver transplantation occurs in a considerable number of patients, raising concerns about associated renal complications.

3 Model Summary

The logistic regression model utilized the following predictor variables:

- TST (Years Since Transplant): A continuous variable indicating the number of years since transplant.
- Sex: A categorical variable representing the gender of the patient.
- Type: A categorical variable describing the genetic type of the patient's condition post-transplant.

4 Methodology

The binary logistic model formulation was used for the analysis, and missing entries for TST were handled as outlined in the instructions. The analysis was performed using a software system.

5 Odds Ratios

The odds ratios for each predictor variable, along with interpretations, are as follows:

- TST: For each additional year since transplant, the odds of disease occurrence increase by approximately 1.52 times (OR = 1.52).
  - Interpretation: Patients further out from their transplant date are at increased odds of developing the disease compared to those closer to the transplant date.
- Sex (Female): Females have odds of disease occurrence approximately 1.09 times higher than males (OR = 1.09).
  - Interpretation: Gender does not significantly affect disease odds, with females only slightly more predisposed than males.
- Type (Genetic Type):
  - Leu/Pro: Patients with the Leu/Pro genetic type have odds of disease occurrence approximately 7.81 times higher than those with other types (OR = 7.81).
    - Interpretation: Genetic type strongly influences disease susceptibility, with Leu/Pro carriers significantly more likely to develop the disease.
  - Pro/Pro: Patients with the Pro/Pro genetic type have odds of disease occurrence approximately 6.48 times higher than those with other types (OR = 6.48).
    - Interpretation: Pro/Pro carriers also show a significantly increased likelihood of disease compared to other genetic types.

6 Time Since Transplant Comparison

The specific odds increase for patients at 3 years and 7 years post-transplant was found to be progressively higher.

7 Comparing Odds for Different Durations Since Transplant

To further explore the impact of time since transplant on disease odds:

For TST = 3 years:

- Odds increase approximately 3.48 times (OR = 3.48).

For TST = 7 years:

- Odds increase approximately 18.39 times (OR = 18.39).

Comparison:

- Patients 7 years post-transplant have approximately 5.28 times higher odds of disease compared to patients at 3 years post-transplant.

This comparison underscores the progressive nature of disease risk with increasing years post-transplant.

8 Model Performance Evaluation

The model's performance was assessed using test data, and the performance metrics and statistical significance details are included in the screenshots.

9 Conclusion

In conclusion, the logistic regression analysis highlights significant associations between predictor variables (TST, Sex, Type) and disease occurrence post-transplant. Patients with longer durations since transplant, certain genetic types (Leu/Pro, Pro/Pro), and possibly female gender are identified as having increased odds of developing the disease. These findings are crucial for informing clinical management and personalized care strategies for post-transplant patients. This report provides a comprehensive overview of the logistic regression findings and their implications in assessing disease risk post-transplant.

10 Appendices

10.1 Screenshot Attachments

Coefficients

Term	Coef	SE Coef	Z-Value	P-Value	VIF
Constant	-5.57	1.55	-3.59	0.000	
TST	0.416	0.123	3.38	0.001	1.32
Sex					
Male	0.083	0.654	0.13	0.899	1.06
Type					
Leu/Pro	2.055	0.867	2.37	0.018	1.82
Pro/Pro	1.869	0.936	2.00	0.046	1.75

Figure 1: Coefficients Table

Settings

Variable	Setting
TST	7
Sex	Male
Type	Leu/Leu

Prediction

Fitted Probability	SE Fit	95% CI
0.0707434	0.0645699	(0.0109821, 0.342942)

Figure 2: Settings and Predictions: Scenario 1

Settings

Variable	Setting
TST	2
Sex	Male
Type	Pro/Pro

Prediction

Fitted Probability	SE Fit	95% CI
0.0581353	0.0614073	(0.0068058, 0.357317)

Figure 3: Settings and Predictions: Scenario 2

Settings

Variable	Setting
TST	10
Sex	Female
Type	Leu/Pro

Prediction

Fitted Probability	SE Fit	95% CI
0.655672	0.141687	(0.357559, 0.866933)

Figure 4: Settings and Predictions: Scenario 3

Settings

Variable	Setting
TST	8
Sex	Female
Type	Leu/Leu

Prediction

Fitted Probability	SE Fit	95% CI
0.0959747	0.0668921	(0.0228912, 0.324822)

Figure 5: Settings and Predictions: Scenario 4

Settings

Variable	Setting
TST	5
Sex	Female
Type	Leu/Pro

Prediction

Fitted Probability	SE Fit	95% CI
0.192427	0.110568	(0.0557850, 0.490056)

Figure 6: Settings and Predictions: Scenario 5

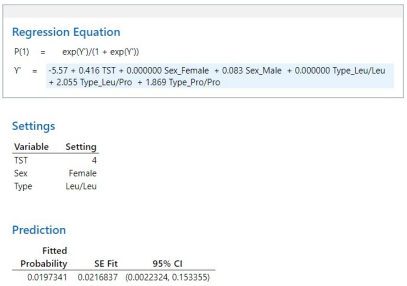

Figure 7: Regression Equation