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Acta Medica Iranica

2009;47(4) : 353-359

Application of artificial neural network to predict graft survival after kidney transplantation: Reports of 22 years follow up of 316 patients in Isfahan

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Abstract:

Background: Kidney transplantation had been evaluated in some researches in Iran mainly with clinical approach. In this research we evaluated graft survival in kidney recipients and factors impacting on survival rate. Artificial neural networks have a good ability in modeling complex relationships, so we used this ability to demonstrate a model for prediction of 5yr graft survival after kidney transplantation.

Methods: This retrospective study was done on 316 kidney transplants from 1984 through 2006 in Isfahan. Graft survival was calculated by Kaplan-meire method. Cox regression and artificial neural networks were used for constructing a model for prediction of graft survival.

Results: Body mass index (BMI) and type of transplantation (living/cadaver) had significant effects on graft survival in cox regression model. Effective variables in neural network model were recipient age, recipient BMI, type of transplantation and donor age. One year, 3 year and 5 year graft survival was 96%, 93% and 90% respectively. Suggested artificial neural network model had good accuracy (72%) with the area under the Receiver-Operating Characteristic (ROC) curve 0.736 and appropriate results in goodness of fit test ($\chi^2=33.924$). Sensitivity of model in identification of true positive situations was more than false negative situations (72% Vs 61%).

Conclusion: Graft survival in living donors was more than cadaver donors. Graft survival decreased when the BMI increased at transplantation time. In traditional statistical approach Cox regression analysis is used in survival analysis, this research shows that artificial neural networks also can be used in constructing models to predict graft survival in kidney transplantation.

Keywords:

[kidney transplantation](#) . [graft survival](#) . [artificial neural networks](#)

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