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Application of statistical experimental design and artificial neural networks to study the formulation variables influencing the characteristics of cefixime tablet

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Background and Aims: The purpose of the present investigation was developing and optimizing cefixime 400 mg tablets using direct compression method.
Methods: Artificial Neural Networks (ANNs) and statistical methods such as Factorial Designs, Response Surface Designs were used to systematically investigation of MgStearate, Polyvinylpyrrolidone (PVP), Lactose, Avicel, Aerosil, AcDiSol and Cefixime concentrations effects on the flowability, hardness and drug release of direct compressed tablets. By inputting the formulation components usage limits accordance with references in Minitab software, suggested forty two formulations were prepared. Flowability and hardness results of formulations were analyzed by Minitab software with three regression methods and observed and predicted results were compared and percent errors of different regression methods were compared.
Results: Four formulations which have appropriate results in the case of flowability and hardness were chosen for release study. Aerosil and AcDiSol had maximum and minimum effect on flowability respectively. MgStearate showed greatest and Aerosil exhibit smallest effect on tablet hardness. Stepwise method had better efficiency in the prediction of results in standard and test group. All selected formulations released more than 75% of the drug during 45 minute which was acceptable according to the USP34 criterion.
Conclusions: Use of various types of experimental designs, response surface methodology and ANN is a widely experienced approach in the development and optimization in drug development. These techniques require minimum experimentation and time, thus to be more effective and cost-effective than the conventional methods in formulation of dosage forms.

Keywords: Cefixime; Artificial neural networks; Response surface