

Quality-by-design Approach in the Optimization of an Alcohol-free Praziquantel Oral Solution [†]

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Abstract: The design of experiments is a convenient tool that allows the identification of the most appropriate type and concentration of cosolvents that may influence the solubilization of drugs during the preformulation step. Thus, the purpose of this work was to apply this approach in order to obtain an alcohol-free oral solution of praziquantel, a highly hydrophobic drug. A simple centroid mixture design was chosen, setting as independent factors the cosolvents 2-N-methyl pyrrolidone, polyethylene glycol 400, and water, while the optimized answer was praziquantel solubilization. The final formulation was analyzed in terms of drug concentration in solution, pH and degradation products for over 4 months. Praziquantel solubilization was adjusted by a linear model. The values for the optimized response, theoretical and experimental, were 42.43 and 40.81 mg/ml, respectively, indicating that a 200-fold increase in praziquantel solubilization was obtained. Samples stored at 40 °C and 25 °C maintained initial drug concentration and pH value for over 4 months. Furthermore, the microbiological test showed no microbiological growth according to USP microbiological test. The obtained liquid formulation showed good stability at room temperature, and the proportion of the solvents used considered safe at the dose needed for treating intestinal taeniasis. It is worth mentioning that the optimized alcohol-free formulation could also be prescribed for pediatric patients.

Keywords: praziquantel; quality by design; oral solution.

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Conflicts of Interest

The authors declare no conflict of interest.