Even though steel bar is a conventional reinforcement in soil stabilization systems, the problem of corrosion of steel may lead to vast damages especially in aggressive environments. In the past decades, Fiber Reinforced Polymer (FRP) materials have offered an effective solution to overcome the corrosion problem. Despite numerous bond stress displacement models for reinforcements in concrete, there is a lack of models for FRP nails in grout. In this paper, the usability of four bond stress models (Malvar, EPB, CMR and Soroushian) of reinforcements in concrete was evaluated to predict the bond stress of FRP nails in grout. For this purpose, the results of several experimental pullout tests were used to calibrate the reinforcement-concrete bond stress models and the constant parameters were obtained. To evaluate the accuracy of the calibrated models, four statistical criteria of R2, SSE, RMSE and MAPE have been also determined for each model. Results showed that Malvar model with R2 of 0.94 and MAPE of %21 was deemed suitable for the prediction of bond stress of GFRP nails while CMR model is not recommended.