Introduction: Various models were devised for prediction of difficult intubation but have low positive predictive value, sensitivity and specificity. Recently 'Upper Lip Bite Test(ULBT)' was used to predict difficult intubation. No models have yet been evaluated using this new simple and reliable bedside test. We aimed to predict difficult intubation from various bedside airway predictive indices, in isolation and combination, and study the addition of ULBT to other screening tests in order to formulate a multivariate model that can aid in accurate prediction of difficult intubation.

Methods: A prospective double blind study was conducted on 500 adult patients scheduled for elective surgery under general anesthesia after approval by the Institutional Ethics Committee and written informed consent by the patient. They were preoperatively assessed for weight, height, dentition, inter-incisor gap(IIG), mandible luxation, ULBT, Mallampati grading(MPS), thyromental-distance(TMD), sternomentaldistance(SMD), head-neck movements(NM) and neck-circumference(NC). After standardized induction of anesthesia, laryngoscopic view with Macintosh blade was classified according to the Modified Cormack and Lehane(MCL) classification by an experienced anesthesiologist. Intubation was considered difficult if MCLgrades 2b, 3 or 4, more than 3 attempts at tracheal intubation, special maneuvers or devices or multiple laryngoscopists were used to facilitate tracheal intubation. Variables’ association with intubation findings was evaluated using chi-square statistic and percentage contribution to intubation difficulty using z-test. Sensitivity, specificity, positive and negative predictive value analyses were done for each variable. Stepwise logistic regression identified the multivariate independent predictors of difficult intubation and combinations were made using forward selection process. 8 models were formulated and ROC curve worked out for them. Sensitivity and specificity analysis finally validated the model.

Results: The incidence of difficult intubation in our study population was 8.8% with Cormack Lehane grade III and 29% when above-mentioned criteria were used. Age, sex, weight, BMI, snoring, OSA, diabetes, hypertension, ULBT, TMD, SMD, NM, NC and IIG had significant correlation with difficult intubation. Gender, height, past history other than diabetes did not gain any statistical significance. ULBT,MPS,NM,NC and SMD model had highest percentage contribution in determining difficult intubation. Based upon sensitivity, specificity analysis, model comprising of MPS,NM, NC and SMD was found to be most accurate. It had highest sensitivity 80%, specificity 87% and Area Under Curve 0.90, thus validating the model.

Discussion: We have developed a clinical prediction model comprising of four bedside airway screening tests MPS,SMD,NM and NC that has highest accuracy in predicting difficult intubation. Addition of ULBT did not improve the sensitivity or specificity of the model but it increased the percentage contribution, thus, it is an easy, reliable and accurate bedside screening tool that can be used for prediction of difficult intubation in combination with our model.