**Abstract:**

Meat is an important source of high-value animal protein, fats, vitamins, minerals and carbohydrates. In Pakistan, different forms of meats are consumed to fulfill nutritional requirement. Pakistan being a Muslim state prefers to consume halal meat, however, a high burden on livestock industry has triggered the mixing of meat from non-halal sources with halal meat. Here, we have used $^{1}$H-Nuclear Magnetic Resonance (NMR) spectroscopy coupled with multivariate data analysis to differentiate different meat types on the basis of metabolites. The metabolite composition of different meat types such as cow, goat, donkey and chicken were studied by using $^{1}$H-NMR spectroscopy. Linear discriminant analysis (LDA) revealed significant separation among four meat types. Furthermore, canonical discriminant classification and Multilayer perceptron neural network analysis (MLP) proved beneficial in identifying potential metabolites responsible for the differentiation among four meat types. The relative quantification of differentiating metabolites was performed by using One-way ANOVA and tukey test. Butyric acid, palmitic acid, alanine, 3-Hydroxybutyrate, arginine and lysine were found as distinguishing metabolites and could be used as potential biomarkers to differentiate different meat types in future.