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## Development of a spectroscopic method to determine the crystallization stage of human bile

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Cholesterol gallstones also known as cholesterol cholelithiasis, is one of the most prevalent digestive diseases seen mainly in the western world and demands costly treatment. It is now becoming prominent in Asian countries due to the adaptation of western diets. In general, bile of patients with gallstones (lithogenic bile) has a different composition of its major constituents of bile salts, phospholipids and cholesterol. The method currently available to determine whether a patient has lithogenic bile or not is to do a microscopic study *ex vivo* for the appearance of cholesterol crystals. This is a tedious process as it is difficult to detect these crystals accurately. Here, we have investigated the possibility of developing a simple and novel spectroscopic method to identify lithogenic from non-lithogenic bile, using UV-visible spectroscopy by analyzing 20 samples (non-lithogenic - 2, lithogenic - 18). The absorption spectra obtained for lithogenic and non-lithogenic bile exhibit a remarkable difference even without any chemical treatment. Lithogenic bile shows maximum absorption ($\lambda_{max}$) at higher wavelengths than non-lithogenic bile, in the visible region as depicted in Figure 1.

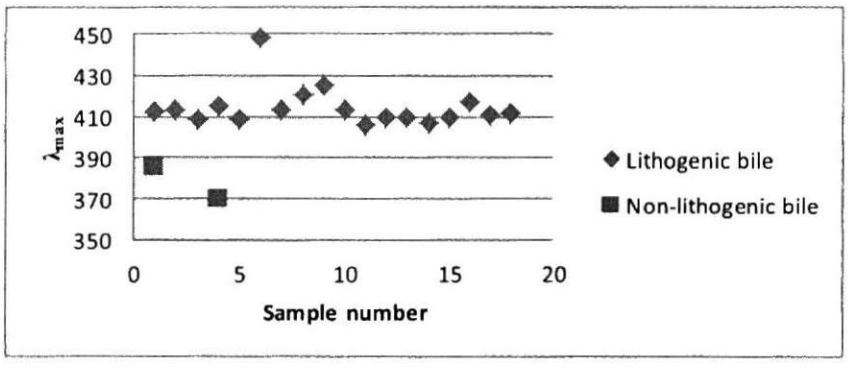


Fig.1: Distribution of $\lambda_{max}$ for non-lithogenic and lithogenic bile

Further, an *ex vivo* study of the variation in absorbance at the respective $\lambda_{max}$ with time for several samples revealed that non-lithogenic bile showed an increase in absorbance in the initial days of incubation while no such increment was observed for lithogenic bile.

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