Development and application of total error strategy in the validation of UV-Visible spectrophotometric methods to detect substandard antibiotics

In the fight against substandard and falsified medicines which are mainly circulating in low-income countries, this present work aims to develop and validate simple, accurate and low-cost UV-Visible spectrophotometric analytical methods to the ensure quality control of medicines marketed in DR Congo. The study concerns four antibiotics (cefixime, erythromycin, tetracycline, and chloramphenicol). Three methods were developed and validated using the strategy of total error represented by the accuracy profile as tool decision for the validation. The selectivity, trueness, precision (repeatability and intermediate precision), accuracy, linearity, limit of detection / limit of quantitation, and dosing range were the validation parameters that we took into account according to guidelines of the International Conference on Harmonization ICH Q2 (R1). In addition, due to the important matrix effect detected in pharmaceuticals samples during the development of the cefixime method, we switched to a method of mettered additions. These validated methods were subsequently applied to samples collected in the formal and informal pharmaceutical markets in Lubumbashi. From these, 14 % (14/101) of samples were under-dosed (12 cefixime and 2 erythromycin drugs), according to the USP specifications (90 – 110 % for cefixime, 90 - 125 % for tetracycline and 90 – 120 % for chloramphenicol and erythromycin); the under-dosed samples contained the active ingredients in the range 67 to 86 %. The routine use of these methods will promote the strengthening of quality control laboratories in DR Congo.