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OPTICAL PROPERTIES OF THE ANTIBIOTIC LEVOFLOXACIN

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Abstract

In an infectious clinical condition, the gold standard treatment is antibiotic therapy. However, some medications could suffer photodegradation when exposed to light (artificial, environmental, or a therapy as photobiomodulation). Light absorption by these molecules could initiate chemical reactions. Thus, an understanding of how light interacts with antibiotic (ATB) is necessary and this is possible through the study of its optical properties. To measure diffuse transmittance (Td) and diffuse reflectance (Rd) of levofloxacin (LVX) and indirectly to determine the absorption (μa), reduced scattering (μ's) and reduced attenuation (μ't) coefficients of this ATB. The ATB used was the LVX (500mg, tablet, Tavok®). The tablet was macerated and the powder was solubilized in MilliQ® water at a final concentration of 10x10-3mol/L. A spectrophotometer was used to register the Td and Rd spectra of the solution. Quartz cuvettes with an optical path of 1.0cm were used and the data were registered in the range of 400 to 1000nm. From the Td and Rd spectra, the values of the μa, μ's and μ't of the ATB were calculated using the Kubelka-Munk function. Statistical analysis to compare ATB coefficients at 450, 530, 590, 660, 780 and 810nm was performed using the Origin software. Two way-ANOVA with Tukey post hoc test and significance level $\alpha<0.05$ was used. The Td value was 10% at 450nm and increased to 32% at 810nm. The Rd was 45% at 450nm and decreased to 19% at 810nm. There was no significant difference in μa (0.44 ±0.18cm-1 at 450nm, 0,56±0.27cm-1 at 530nm, 0.64±0.33cm-1 at 590nm, 0.59±0.32cm-1 at 660nm, 0.47± 0.31cm-1 at 780nm and 0.44±0.31cm-1 at 810nm). The μ's decreased with increasing wavelength being 3.08 ± 1.84cm-1 at 450nm, 0.92±0.51cm-1 at 660nm, 0.71±0.42cm-1 at 780nm and 0.65±0.39cm-1 at 810nm. The μ't also decreased with the increasing wavelength being 3.52±1.94cm-1 at 450nm, 1.52±0.82cm-1 at 660nm, 1.18±0.73cm-1 at 780 nm and 1.09±0.70 cm-1 at 810nm. The presence of red and yellow ferric oxide can be related to the high μa values. The low values of Td and high values of the μ's can be related to the magnesium stearate present in the tablet. The high values of μ't suggest that ATB absorbed light. The values of the coefficients studied may have been influenced by the excipients present in the tablet formulation. Therefore, future studies with the pure active ingredient of ATB may provide more concrete information about the optical properties of LVX.

Key words: levofloxacin, antibiotic, spectroscopy, photobiomodulation, optical properties

Study type: Estudo espectroscópico