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Towards the application of biocompatible excipients to improve the stability of avian immunoglobulin Y (IgY) antibodies, foreseeing their use as biopharmaceuticals

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PURPOSE OF THE ABSTRACT

Immunoglobulins or antibodies are glycoproteins produced by jawed vertebrates to provide them immunity against bacteria, viruses, among other foreign agents [1]. Within the numerous immunoglobulins classes, avian immunoglobulin Y (IgY), that can be found in the serum of chickens and other egg laying animals and in egg yolk, is a promising antibody to be used as biopharmaceutical [2]. Contrarily to its analogous mammalian immunoglobulin G (IgG), IgY exhibits high immunogenicity and binding avidity, and the capability to be recovered by a non-invasive method [3-5]. The amount of IgY isolated from an egg is equal to that from 200-300 mL of mammalians blood, being viable for a chicken to produce 17-35 g of total IgY antibodies [3,6]. By being a polyclonal antibody, IgY recognize several epitopes on an antigen and have various applications, such as in the treatment of several diseases [3,4]. However, by being proteins present in a complex media, the use of IgY as a biopharmaceutical is restricted by its recovery at high yields and high purity, along with their preservation [2]. This work aimed to improve the stability of IgY during storage, so that it can be used as a biopharmaceutical. IgY antibodies were isolated from the yolk of commercial chicken eggs and purified by two-step precipitation methodology. Their stability was assessed by Circular Dichroism Spectroscopy (CD) under 1- 3 weeks of storage at -20 ºC. Trehalose and xylitol at several concentrations were investigated as stabilizing agents. The IgY purity degree, concentration and the percentage of aggregates formed during storage were determined by Size Exclusion- High Performance Liquid Chromatography (SEC-HPLC), whereas the protein profile was unveiled by dodecyl sulphate polyacrylamide gel electrophoresis (SDS-PAGE). Both stabilizers allowed promising results, being potential stabilizing agents for IgY. A decrease in the percentage of aggregates was verified in IgY formulations with trehalose and xylitol in all storage conditions. It was confirmed the presence of ?-sheets in the IgY secondary structure, and no substantial evidence of degradation of its secondary structure occurred during storage with these compounds.

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FIGURES

FIGURE 1

FIGURE 2

KEYWORDS

Avian Immunoglobulin Y (IgY) | purification platform | stability | biocompatible excipients

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