عنوان مقاله:

Evaluation of two factors on hyaluronic acid production by mutant strain of Streptococcus equisimilis by response surface methodology

محل انتشار:

چهارمین کنگره بین المللی و شانزدهمین کنگره ملی ژنتیک (سال: 1399)

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خلاصه مقاله:

Background and Aim: Hyaluronic acid (HA) as a biodegradable, biocompatible, non-immunogenic linear polysaccharide has been used in many applications such as pharmaceutical, clinical and cosmetics. Currently, commercial HA for human use is mainly produced by fermentation, specifically using Streptococcus sp. In present study we improved HA production by by mutant strain of Streptococcus equisimilis as one of the best strains producing hyaluronic acid capsule. Two of the most important factors in Culture medium are pH and temperature. The most frequently used optimization strategy is “one-at-a-time” strategy. This approach is not only time consuming, but also ignores the combined interactions between physiochemical parameters, So in this study we optimized these two factors under medium culture conditions by using response surface method(RSM) As empirical modeling technique and then we optimized pH and temperature . RSM combines statistical experimental designs and empirical model developing by regression with a purpose of process or product optimization.Methods: In first step we used the Minitab۱۷ software to design of experiment in RSM by Central composite design(CCD) method. Maximum and minimum values were also considered according to recent studies. The minimum and maximum temperatures were ۳۰ ° C and ۳۷ ° C, respectively, as well as the minimum and maximum pH values of ۵.۵ and ۸.۰, respectively. Finally, experiment was carried out with ۱۴ run, ۲ block and ۶ center points. In the next step the primary seed of Streptococcus equisimilis were cultured in Todd Hewitt Broth for ۱۶ h. The production medium containing Na۲HPO۴·۱۲H۲O, KH۲PO۴·۵H۲O, MgSO۴·۷H۲O, yeast extract, and glucose was inoculated by ۱۰% of seed at OD۶۰۰nm ۱, and incubation for ۶ h of HA production (in ۱۸۰ RPM, ۳۷°C) . Then, HA was precipitated by A special method based on SDS ۰.۱% /Ethanol/citrate and acetate buffer.The amount of proteins and nucleic acids was assayed at OD۲۸۰nm and OD۲۶۰nm. The HA concentration was determined by complexometery method using carbazole assay at ۵۵۰ nm. Finally, HA values were evaluated and interpreted with MINITAB ۱۷ software.Results: The findings showed that the yield of HA extracted from Streptococcus equisimilis in Culture medium with pH:۸.۰ and temperature ۳۷°C is ۳.۲۷ mg/ml and its yield was more than other values of pH and temperature.Conclusion: Optimization of pH and temperature in the culture medium by central composite design (CCD) method can be considered as a good strategy for increasing the amount of HA production.

کلمات کلیدی:

Hyaluronic acid, Streptococcus equisimilis ,Carbazole, central composite design