Effect the liquid extract of *Calendula officinalis* in surgical wound healing process in the abdomen of mice.

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**Abstract**

Twenty-eight male Wistar rats were divided in two groups: Control Group (CG) - underwent incision and suture; and Incision and + COE Group (COEG) - underwent incision, suture and intraperitoneal administration of *Calendula officinalis* extract (150 mg / kg). On the third and seventh days after surgery, samples of incisional wounds were collected for immunohistochemical and tensile tests. The effectiveness of using liquid extract of *Calendula officinalis* has been shown to increase the limits of resistance and break in incisional wounds. Immunohistochemical tests are being performed.

Key words: Incisional hernias (IH), metalloproteinases, *Calendula officinalis*

**Introduction**

The occurrence of incisional hernias (IH) ranges from ten to fifteen percent of patients undergoing laparotomy, what is attributed to higher expression of matrix metalloproteinases (MMPs) 1, 2 and 13, whose substrates are collagen protein components of the extracellular matrix of tissues. Another factor associated with IH in laparotomy is the decrease of ratio of collagen type I and type III, which was associated with a marked expression of MMP-2 [1, 2]. Therefore, studies indicate that reducing the expression of MMPs, occurrences of IHs are minimized, and this can be done using drugs [2]. Thus, the objective of this project was to evaluate the effectiveness of the liquid extract of *Calendula officinalis* in the healing of surgical wounds [3].

**Results and Discussion**

Ethical approval for this research was obtained from the Research Ethics Committee of Campinas State University – UNICAMP. Twenty-eight male Wistar rats were distributed into two groups: Control Group (CG) - underwent incision and suture; Incision and + COE Group (COEG) - underwent incision, suture, and intraperitoneal administration of the liquid extract of *Calendula officinalis* (150 mg / kg). On the third and seventh days after surgery, samples of incisional wounds were collected for immunohistochemical tensile tests. Results of tensile tests are shown in Table 1, and Tukey test (p <0.05) was used to compare the means.

**Tabel 1.** Results of tensile test – (1) resistance limit, N; (2) displacement at resistance limit (mm); (3) stiffness, (kN m⁻¹); and break limit (N)

<table>
<thead>
<tr>
<th>Group</th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CG (n = 6) (3rd. day)</td>
<td>4.18a</td>
<td>5.06a</td>
<td>8.52a</td>
<td>0.98a</td>
</tr>
<tr>
<td>COEG (n = 6) (3rd. day)</td>
<td>10.06a</td>
<td>9.94a</td>
<td>2.09a</td>
<td>2.30b</td>
</tr>
<tr>
<td>CG (n = 6) (7th. day)</td>
<td>12.21b</td>
<td>5.65b</td>
<td>5.57b</td>
<td>2.44c</td>
</tr>
<tr>
<td>COEG (n = 7) (7th. day)</td>
<td>17.52c</td>
<td>5.97b</td>
<td>6.11b</td>
<td>3.51d</td>
</tr>
</tbody>
</table>

Notes: Means labelled with the same letter are not significantly different from each other following the Tukey test (p <0.05).

**Conclusions**

According to the experiments, the use of liquid extract of *Calendula officinalis* increased the limits of resistance and break in incisional wounds.

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