The Source of Candida Albicans in Chronic Paronychia of Adults Women in Hilla City

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Abstract
The infected fingers in chronic paronychia were mostly on the dominant hand. Little fingers were less and middle fingers more effected than expected. Oral Candida albicans carriage was significantly less when the first finger to be infected was the middle finger. The duration of the disease was related to the number of infected fingers, but not to oral C.albicans carriage.

Introduction
Chronic paronychia is one of the most common skin infections of the hands [1]. It counted for 60% of the patients, suspected of having dermatomycosis [2]. It is the most common nail complaint of patients seen by dermatologists [3, 4], causing very considerable discomfort to the patients [5]. The chronic paronychia occurs damage, but most commonly between 30 to 60 years. It might also occur in children as a result of finger or thumb sucking [4]. In adults the index and the middle finger of the left are most often involved as they are suspected for accidental trauma in comparison to others in some cases[6].

Chronic paronychia is a frequently encountered infection due to Candida albicans [7], and rarely to other Candida spp. It was found that C.albicans was more often found in the mouth of female patient with chronic paronychia than in control females matched for age [8].

Aim of the Study
To determine if a relationship exists between the presence of C.albicans in the oral cavity and the first finger to be infected.

Materials and Methods
130 women over 16 years of age, who were suffering from chronic paronychia, were examined through a period of April 2005 to August 2005 in Mirjan Teaching Hospital. Their hands were classified as most used hand (MUH) and least used hand (LUH). Swabs for C.albicans were taken from the patients mouths and inoculated directly onto sabourauds dextrose agar and cornmeal agar.

C.albicans was identified by the development of chlamydospores on cornmeal agar [9], or in the absence of chlamydospores by the development of germ tubes in human serum at 37 ºC [10]. The date of the onset of the infection was...
noted, as well as the order in which the fingers become infected. The first finger infected (FFI) was classified as *Candida* species other than *C. albicans* were isolated from the mouths of six patients, these were excluded from this study.

**Results**

As shown in table (1) the (FFI) was on the MUH in (73) patients, and in the LUH in (28) patients. There was a significant difference between the MUH and LUH (P<0.001). The thumb was the FFI in 31 cases, the index finger in 28, the middle finger in 28, the ring finger in 10, and the little finger in 4. The different between the fingers was significant (p<0.001). The little finger had a much lower incidence of infection than expected, and both the middle finger and the thumb showed a much higher incidence than expected. *C. albicans* was seen to be present in the mouth of 19 out of 31 patients when the thumb was the FFI. When the index finger was FFI 19 out of 28 carried *C. albicans* the mouth, when it was the middle finger 9 out of 28, when it was the ring finger 6 out of 10, and in the little finger 3 out of 4. There was a marked lowering of incidence of *C. albicans* carried in the mouth when the FFI was the middle finger than when the FFIs were other fingers (p<0.05).

As shown in the table (2), *C. albicans* was found in the mouth of 23 out of 49 patients with chronic paronychia of less than one year duration, and in 24 out of 45 patients who were infected for more than one year. There was no statistical significance.

Table (3 ) shows that the number of infected fingers is related to the duration of infection. In the first year of infection one finger was affected in (38) patient, more than one finger in 30 patient, while 10 patients had 4 or more fingers affected. After the first year one finger was affected in 13 patients, and more than one finger in 37 of the latter, 21 had 4 or more fingers affected. This was a significant difference (p<0.001). the number of affected fingers was not related either to the presence of *C. albicans* in the mouth or to the FFI.

<table>
<thead>
<tr>
<th></th>
<th>Thumb</th>
<th>Index finger</th>
<th>Middle finger</th>
<th>Ring finger</th>
<th>Little finger</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>MUH</td>
<td>MUH</td>
<td>MUH</td>
<td>MUH</td>
<td>MUH</td>
</tr>
<tr>
<td></td>
<td>LUH</td>
<td>LUH</td>
<td>LUH</td>
<td>LUH</td>
<td>LUH</td>
</tr>
<tr>
<td><em>C. albicans</em></td>
<td>13</td>
<td>6</td>
<td>11</td>
<td>8</td>
<td>6</td>
</tr>
<tr>
<td>Number</td>
<td>9</td>
<td>3</td>
<td>7</td>
<td>2</td>
<td>16</td>
</tr>
<tr>
<td>Total</td>
<td>22</td>
<td>9</td>
<td>18</td>
<td>10</td>
<td>22</td>
</tr>
</tbody>
</table>

Table 1 Relationship between oral *Candida albicans* carriage and first infected finger.
**Table 2** Duration of disease and oral *Candida albicans* carriage.

<table>
<thead>
<tr>
<th>Duration</th>
<th><em>C. albicans</em></th>
<th>Candida number</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than one year</td>
<td>23</td>
<td>26</td>
<td>P&gt;0.001</td>
</tr>
<tr>
<td>More than one year</td>
<td>24</td>
<td>21</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>47</td>
<td>47</td>
<td></td>
</tr>
</tbody>
</table>

**Table 3** Number of infected fingers and duration of the disease.

<table>
<thead>
<tr>
<th></th>
<th>One finger</th>
<th>2-3 fingers</th>
<th>4 or more fingers</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than one year</td>
<td>38</td>
<td>20</td>
<td>10</td>
<td>P&lt;0.001</td>
</tr>
<tr>
<td>More than one year</td>
<td>13</td>
<td>16</td>
<td>21</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>51</td>
<td>36</td>
<td>31</td>
<td></td>
</tr>
</tbody>
</table>

**Discussion**

Theoretically, the source of *C. albicans* in the FFI could be the vagina, mouth or bowel of the patient. Another possible source might be contaminated family underwear or napkins hand-washed by the patient. However, *C. albicans* is rarely found in the vagina of patients with chronic paronychia [8], and so this site seems to have little epidemiological significance. There is a fact that strengthen the assumption that patient's mouth and stool (and or the washing of underwear) are important source of *C. albicans* infection in chronic paronychia, this fact is when the FFI was the middle finger *C. albicans* was present less often in the mouth than when other fingers were the first to be infected. Both the thumb and index fingers are in more intimated contact with the mouth than the middle finger while eating or removing food particles from between the teeth, or in handling dental prostheses.

Table (2) shows that there is insignificant rise in the incidence of *C. albicans* found in the mouth when the chronic paronychia is of extended duration, obviating the possibility of the mouth being secondarily infected from paronychia, rather than the nail fold being infected from the mouth. In a previous study [11], we found positive correlation between the presence of *C. albicans* in the mouth and chronic paronychia. In [5], they postulated that two factors are necessary for the development of chronic paronychia:

1- Contact with the source (mouth or stool of the patient's family), this contact being made more often by the MUH than by the LUH, and only rarely by the little finger.

2- The occurrence of the mechanical trauma which destroys the cuticle
facilitates of the nail-fold. Most patients wash their clothes by scrubbing them over dorsa and the distal phalanges of the fingers, particularly the middle finger. The little finger is rarely used in the washing process. Our hypothesis also explain the differing results of experimental infection. [12] succeeded in establishing an acute C.albicans infection after occlusion of the nail-fold with adhesive tape for 30 days. However, at that time neither rounding out nor retraction of the nail-fold had occurred; but they did occur 7-10 days after removed of the tape, which stripped the cuticle was necessary for invasion of nail fold by C.albicans which was a related present in the environment.

From the results, the study concluded that, the mouth and the bowel, but not the vagina, of the patient, or her family, are sources of C.albicans in chronic paronychia, mechanical trauma that destroys the cuticle is responsible for the invasion of C.albicans in to the nail fold, this trauma in our patients is mostly due to rubbing during hand washing of do this.

References