

## Aerobic Bacteria Associated with Paronychia and their susceptibility pattern to antibiotics

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### Abstract

**background:** Paronychia is an inflammation of the tissue alongside of the nail. Most hand infections are the result of minor wounds that have been neglected. The nail disease paronychia commonly misidentified. **Objectives:** This study was conducted to identify aerobic bacteria associated with paronychia and their susceptibility to antibiotics in Khartoum, Sudan during the period from March to May 2012. **Method:** Thirty four fingers swab were collected, cultivated, and identified by proper procedures using bacteriological and biochemical tests. All isolated bacteria were subjected to antibiotics susceptibility tests. **Results:** the current study showed highest percentage of isolated organism was *Staphylococcus aureus* (83.7%) followed by *S. delphini* (7 %) and *S.intermedius* (2.3 %). Whereas there are (7 %) of unknown microorganism. The present study showed that (67.5 %) of patients infected with paronychia were females whereby (32.5 %) were males, children occupied (53.5 %) of paronychia patients, and the adults were (46.5 %). Finger as the site of infection occupied 100%. While the toe were quietly zero percent. A (28 %) of paronychia patients predisposed this infection by finger sucking, and the other (72 %) were by finger biting. This study revealed the percentage sensitivity of antimicrobial against isolated organism as follow: *S. aureus*: sensitive for cotrimoxazole (44.4 %), gentamycin (63.6 %), clindamycin (100 %) and amoxicillin (69.4 %). *S. dilphini* and *S. intermedis* provided sensitive (100 %) to all tested antimicrobials.

**Conclusion:** Paronychia was commonly results from *Staphylococcus aureus*. The majority of individual infected by paronychia was female as well as children. Clindamycin was the most effective antibiotic against isolated bacteria.

**Keywords:** Paronychia, nail disease ,*Staphylococcus aureus*, Clindamycin

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## Introduction

The nail disease paronychia commonly misidentified as a synonym for whitlow or felon, is an often-tender bacterial or fungal hand infection or foot infection where the nail and skin meet at the side or the base of a finger or toenail. The infection can start suddenly or gradually<sup>1,2</sup>. Paronychia divided into acute and chronic Paronychia<sup>3</sup>, also may be divided according to the causative agent into candidal and pyogenic paronychia<sup>4</sup>. The most common causative pathogen is *Staphylococcus aureus*, although *Streptococcus pyogenes*, *Pseudomonas pyocyanea*, and *Proteus vulgaris* can also cause paronychia<sup>2,5,6</sup>. Chronic paronychia is a multifactorial inflammatory reaction of the proximal nail fold to irritants and allergens<sup>7,8,9,10</sup>. This disorder can be the result of numerous conditions, such as dish washing, finger sucking, aggressively trimming the cuticles, and frequent contact with chemicals (e.g., mild alkalis, acids). In chronic Paronychia, the cuticle separates from the nail plate, leaving the region between the proximal nail fold and the nail plate vulnerable to infection by bacterial and fungal pathogens<sup>7,10</sup>. Chronic paronychia has been reported in laundry workers, house and office cleaners, food handlers, cooks, dishwashers, bartenders, chefs, fishmongers, confectioners, nurses, and swimmers. In such cases, colonization with *Candida albicans* or bacteria may occur in the lesion<sup>8,10</sup>.

In patients with acute paronychia, only one nail is typically involved<sup>11</sup> The condition is characterized by rapid onset of erythema, edema, and discomfort or tenderness of the

proximal and lateral nail folds<sup>12</sup>. An untreated infection may evolve into a subungual abscess, with pain and inflammation of the nail matrix<sup>12</sup>. Recurrent acute paronychia may evolve into chronic Paronychia<sup>6,13</sup>.

### **Rational**

Nowadays it has been recognized an increase in the number of patients who's diagnosed with Paronychia this study focus on the subject of bacterial etiological factors associated with paronychia and the predisposing factor that might induced incidence of paronychia.

### **Objectives**

1. To isolate and identify aerobic bacteria associated with paronychia.
2. To detect the antimicrobial susceptibility.

### **Methods**

A cross sectional study conducted on the communities that are agricultural and those with poor hygiene to isolate aerobic bacteria associated with paronychia, during the period from January to May 2012, in Sudan.

### **Collection of specimen**

A 43 swabs samples collected from finger nail of patients with typical condition of paronychia, then transported using Stuarts transport medium<sup>14</sup>.

### **Isolation of microorganism**

The swab specimens were cultured under aseptic condition in Blood agar as enriched medium, Mac conkey agar as selective and differential medium, and Mannitol salt agar as selective medium. The plates were incubated aerobically at 37°C for 24 hours<sup>14</sup>. Then identification tests were done for any bacteria growth using biochemical tests such as Catalase test, coagulase, Fermentation of Mannitol, Sugar fermentation media.

### **Antimicrobial susceptibility test**

Antibiotic sensitivity test was performed by disc diffusion method (Kirby-Bauer's technique) using commercially available discs (HiMedia, India) and the results were recorded following the instruction of manufacturer. These test disks used included: Cotrimoxazole, Gentamycin, Clindamycin and Amoxicillin. For clinical and surveillance purposes and to promote

reproducibility and comparability of results between laboratories, WHO recommends the (NCCLS) modified Kirby-Bauer disc diffusion technique<sup>14</sup>.

## Result

A total of 43 specimens from Paronychia positive patient showed that n=30 (67.5 %) were female and n=13 (32.5 %) were males, also results showed that children occupied n=23 (53.5 %) of Paronychia patients, and the adults were n=20 (46.5 %) (Table 1).

**Table (1): Categories of pronychia according to gender and age**

Parameter	Number of sample	%
Female	30	67.5%
Male	13	32.5%
<b>Total</b>	43	100%
Children	23	53.5%
Adult	20	46.5%
<b>Total</b>	43	100%

Results showed that finger as the site of infection occupied 100%, and the toe were quietly zero percent (Table 2).

**Table (2): different sites of Pronychia**

Site of infection	No	%
Finger	43	100
Toe	0	-

Also the results showed that 28 % of Paronychia patients predisposed this infection by finger sucking, and the other 72 % were by finger biting (Table 3).

**Table (3): types of Paronychia according to etiology**

Etiology	No	%
Finger sucking	12	28 %
Finger biting	31	72

According to the causative agents of Paronychia infection 83.7 % were caused by *S.aureus*, 7 % by *S.delphini*, 2.3 % by *S.intermedius*, and the rest 7 % were unknown (Table 4).

**Table (4): Various bacterial causative agents of Paronychia**

Causative agent	No	%
<i>Staphylococcus aureus</i>	36	83.7%
<i>S.delphini</i>	3	7%
<i>S.intermedius</i>	1	2.3%
Unknown causative agent (no growth)	3	7%

Results of the in vitro susceptibility of bacteria isolated from Paronychia patients to various antimicrobial agents shown in Tables (5) . In general *S.delphini* and *S.intermedius* were susceptible to all used antibiotics(100%). however, a high percentage of resistant strains was found amongst *Staphylococcus aureus* table (5).

**Table (5): Susceptibility of bacteria isolated from Paronychia patients to various antimicrobial agents:**

Parameter	Cotrimoxazole	Gentamycin	Clindamycin	Amoxicillin
<i>Staphylococcus aureus</i>	44.4	63.6	100	69.4
<i>S.delphini</i>	100	100	100	100
<i>S.intermedius</i>	100	100	100	100

## Discussion

Our result indicate that *staphylococcus aureus* is the most causative agent of paronychia n=36 (83.7 %) which agree with the previous studies that conducted in the late 1960 by stern 1983 that showed 80 % of hand infections due to *Staphylococcus aureus*, Pamela and Rockwell 2001, and Dimitris in 2008 and disagree with that study which conducted in 2004 by Dorko that revealed 6.9 % (3/43) and Houshian 1992-2001 stated that (44 %) of bacterial causative agent of paronychia were pure *Staphylococcus aureus*<sup>2,15,16,17</sup> .

Also our result revealed that 3 samples gave *Staphylococcus delphini* (7.5 %) and one sample gave *Staphylococcus intermedius* (2.5 %). This might be due to contact and animal biting. Also in our study, no bacterial growth was found in n=3 (7 %) of cases. There might be several possible reasons for this. First, prescribing antibiotics before obtaining cultures of specimens is known to interfere with the recovery of causative agents by culture. Second, it may have been under detected because of inadequate techniques for isolation and identification in the period covered, this agree with that study which conducted by Houshian 2001 that showed 11% of cases without growth <sup>16</sup>.

In our study all patients had finger nail involvement and none had toe nail involvement this agree with Dorko 2004 <sup>15</sup>. Out of 43 samples, n=13 (32.5 %) of hand infections were males and n=30 (67.5 %) were females. This agrees with study conducted by Dorko, which appear that males occupied n=11 (25.5 %) and n=32 (74.5 %) were females and disagree with Houshian *et al* (2001) who their study showed that (71%) of cases in male and (29%) in female. This high incidence in females than males might be due to having hands in water a lot (as from a job washing dishes in restaurant, manicure procedures (trimming or pushing back the cuticles) and other manipulation Rockwell, 2001 <sup>2,15,16</sup>. Also our result showed that (53.5 %) of cases in children whereas (46.5 %) in adults. This might be due to direct inoculation of fingers with flora from the mouth secondary to finger sucking and nail biting. This finding disagree with that study which conducted by dorko 2004 <sup>15</sup>. Also our result revealed that the etiology of paronychia was due to finger biting (72 %) and finger sucking (28 %). This could be due to high ability of finger biting to enables bacterial inoculation of the nail and subsequent infection. Agree with previous studies done by Pamela and Rockwell in 2001 and Dimitris in 2008 <sup>18</sup>.

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