

# Quantitative Variations in Distribution of *Pityrosporum orbiculare* on Clinically Normal Skin

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The lipophilic yeast *Pityrosporum orbiculare* has been cultured quantitatively, in 10 volunteers, from clinically normal skin on the chest, back, upper arm, lower leg, and dorsal aspect of the hand. The highest count was on the back (mean 333/cm<sup>2</sup>) and chest (mean 327/cm<sup>2</sup>). This was statistically significant higher than on the upper arm (mean 21/cm<sup>2</sup>), lower leg (mean 13/cm<sup>2</sup>), and dorsal aspect of the hand (mean 2/cm<sup>2</sup>). The variations in number of *P. orbiculare* parallels both regional variations in sebum excretion and the distribution of tinea versicolor lesions. (Received December 2, 1982.)

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*Pityrosporum orbiculare* (*P. ovale*) is not only the etiological agent of tinea versicolor (1) but also a member of the normal human cutaneous flora (2, 5, 6, 7). *P. orbiculare* and *P. ovale* are probably identical; the different micromorphological forms may merely represent different stages in a cell cycle (1, 10). There are few reports describing the qualitative variations in distribution of these yeasts on normal skin (6, 7). Roberts found the highest incidence of *P. orbiculare* on the back, chest, and scalp (7). He studied other areas in a few subjects and found that most peripheral sites were culture negative. Not only are there regional variations in the incidence of *P. orbiculare*, but the incidence is also much lower in children than in adults (3).

Recently, using a special culture medium, we have cultured *P. orbiculare* quantitatively from normal skin and lesions in patients with tinea versicolor and normal skin in healthy volunteers (4).

The present investigation describes regional variations in quantitative culture of *P. orbiculare* from clinically normal skin on the back, chest, upper arm, lower leg, and the dorsal aspect of the hand.

## MATERIALS AND METHODS

Ten healthy males in the age range 18-35 years consented to act as subjects. The week before sampling they used a non-germicidal soap.

### *Quantitative Culture of P. Orbiculare*

1. *Skin area cultured:* Culture material was taken from all subjects, from: the mid-sternum area of the chest, the interscapular area of the back, the lateral aspect of the upper arm, the medial aspect of the middle part of the lower leg, and the dorsal aspect of the hand.

2. *Culture technique.* This is described in detail elsewhere (4). A stainless steel ring, 2.6 cm in internal diameter and 2.0 cm deep covering 5.5 cm<sup>2</sup> area of skin was held in place with moderate pressure on the skin by 2 fingers. One ml of sterile 0.075 M phosphate buffer, pH 7.9, containing 0.1% Triton X-100 was poured into the ring and the skin was then gently rubbed with a Teflon 'policeman' for 1 minute. The fluid was removed by pipette and the procedure repeated three times on the same area. From each sample, serial dilutions were performed in phosphate-buffered saline (PBS), pH 7.2, containing 0.1% Triton X-100. Samples (0.1 ml) from the dilutions were inoculated on a glucose-neoptone-yeast extract agar medium containing olive oil (2%), Tween 80 (0.1%), and glycerol monostearate (2.5 g l<sup>-1</sup>) (1). Plates were incubated at 37°C and examined after 6 days.

3. *Statistics.* The numbers of *P. orbiculare* yeasts, cultured from different skin areas, were compared using the Wilcoxon rank sum test for paired samples.

## RESULTS

The highest number of *P. orbiculare*/cm<sup>2</sup> was found on the back (Table I). This number was significantly higher than counts on the upper arm, lower leg, and the dorsal aspect of the hand ( $p < 0.01$ ), but not on the chest ( $p > 0.5$ ). *P. orbiculare* was found in greater numbers on the upper arm than the lower leg ( $p < 0.05$ ) and the dorsal aspect of the hand ( $p < 0.01$ ). The number of cultured *P. orbiculare* was significantly greater on lower leg than on the hand ( $p < 0.01$ ).

Cultures were positive in all subjects from the back, chest, and upper arm, but negative in one from the lower leg and in 4 from the dorsal aspect of the hand.

## DISCUSSION

*P. orbiculare* and *P. ovale*, which probably is identical with *P. orbiculare* (1, 10), are both lipophilic and require the addition of lipids to the culture medium in order to obtain proper growth (2, 8). Sebum excretion is low in children compared with adults (9); this may be one explanation for the lower incidence of *P. orbiculare* in children compared with adults (3). Sebum excretion is highest on the forehead, greater on the trunk than on the extremities, and is greater on the upper than on lower extremities (9). This agrees with earlier studies in which *P. orbiculare* (*P. ovale*) were found in a higher incidence on the trunk and scalp compared with the extremities (6, 7).

This is the first time that *P. orbiculare* has been cultured quantitatively on clinically normal skin from different skin sites.

The highest counts were registered on the chest and back. The organism was seldom found on the lower leg and scarcely at all on the dorsal aspect of the hand. This difference in distribution may be explained by a difference in sebum excretion. The low count on the

Table I. *Quantitative culture of Pityrosporum orbiculare from clinically normal skin on the back, chest, upper arm, lower leg, and the dorsal aspect of the hand in 10 healthy volunteers*

Cultured Skin Area	Number of <i>P. orbiculare</i> /cm <sup>2</sup> (mean ± SE)
Mid-sternum area of chest	333 ± 167.99
Interscapular area of back	327 ± 170.19
Lateral aspect of upper arm	21 ± 3.89
Medial aspect of middle of lower leg	13 ± 3.65
Dorsal aspect of hand	2 ± 0.67

hand could also be due to the more frequent contact with soap and mechanical scrubbing. The number of *P. orbiculare* cultured from the back tallies with earlier findings (4).

On clinically normal skin from the back of patients with tinea versicolor, a significantly higher number (mean 1 644/cm<sup>2</sup>) was found (4). In another study we investigated the effect of prolonged plastic occlusion on the number of *P. orbiculare* cultured from the back (in preparation). After 3 days of occlusion the number increased to mean of 2 313/cm<sup>2</sup>. Although clothing produces a much less effective occlusion than a plastic film, the greater number of *P. orbiculare* found on the trunk vis-à-vis the extremities might be partially explained by natural occlusion of clothing.

*P. orbiculare* is an opportunistic pathogen which, under the influence of predisposing factors (greasy skin, higher relative humidity and temperature, heredity, systemic corticosteroids, etc), changes from its saprophytic yeast phase to its pathogenic mycelial phase (1). The quantitative variations in *P. orbiculare*, observed in this study reflect the distribution of tinea versicolor lesions. They are most common on the upper trunk and seldom seen on the peripheries of the extremities (8).

Our quantitative culture method for *P. orbiculare* offers possibilities not only to study the distribution on clinically normal skin, but also the distribution in tinea versicolor, seborrheic dermatitis, and other skin diseases.

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