

It should be stressed that it is important to perform the guinea pig maximization test of the ingredients in new products before marketing. In view of the results of the present investigation, proper prevention measures should be performed.

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Age Incidence of *Pityrosporum orbiculare* on Human Skin

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Abstract. We have investigated the incidence of the lipophilic fungi *Pityrosporum orbiculare* and *P. ovale* on clinically normal skin in newborn children and in children at the age of 6 months, 1 year, 5 years, 10 years, and 15 years. *P. orbiculare* was absent in children of less than 5 years of age. It was present in the highest incidence (93%) in 15-year-old children, about the same frequency as in adults. The colonization starts during the period when the sebaceous glands become active. *P. ovale* could not be cultured and this may depend on geographical variations in the distribution of these yeasts.

Key words: *Pityrosporum orbiculare*; *P. ovale*; Culturing study; Children

The two lipophilic yeasts *Pityrosporum orbiculare* and *P. ovale* can be isolated from human skin as apparently true residents (4, 7, 9). *P. ovale* is most often—though not always—found on the scalp of both healthy individuals and patients with seborrhoeic dermatitis (1, 4, 5, 9, 12). *P. ovale* was earlier thought to play some part in the aetiology of seborrhoeic dermatitis, though most workers now believe that seborrhoeic dermatitis is the primary condition (1, 7). *P. ovale* can be cultured not only from the scalp but also from other areas of the skin supplied with sebaceous glands (7, 9).

The other lipophilic member of the genus *Pityrosporum*, *P. orbiculare*, differs from *P. ovale* mainly in its micromorphology (6), although growth characteristics have been used to distinguish the two species (11). It is now generally accepted that *P. orbiculare* and the dimorphic fungus seen in tinea versicolor are one and the same (4). *P. orbiculare* can be cultured not only from tinea versicolor scales but also from normal-looking skin in healthy adults (4, 5, 9). Some workers believe *P. ovale* and *P. orbiculare* to be identical (8, 10), while others consider them to be different (3, 5, 6). This question has not yet been settled.

P. ovale has been cultured from the normal scalp of children but only in small, ill-defined series (12). There are no adequate, published surveys of the

Table 1. Characteristics of subjects included in the study of *pityrosporum orbiculare* on normal-looking skin

	Age						
	Mothers (17-39)	Newborn	6 months	1 year	5 year	10 years	15 years
Females	25	13	13	14	13	17	15
Males	-	12	17	16	17	13	15
Total	25	25	30	30	30	30	30

incidence of *P. ovale* or *P. orbiculare* on the normal-looking skin in children of various ages, or comparison made with adults. We therefore tried to culture *P. orbiculare* and *P. ovale* from normal-looking skin of newborn children and children at the ages of 6 months, 1 year, 5 years, 10 years, and 15 years.

MATERIALS AND METHODS

Specimens for culture were taken from newborn infants and their mothers and from children at the age of 6 months, 1 year, 5 years, 10 years, and 15 years. Informed consent was given by parents in all cases. The material is summarized in Table 1. It included 25 healthy mothers and their healthy babies, and in each of the other groups, 30 healthy children. From the children, skin scrapes for culture were taken with the aid of a curette from normal-looking skin on the back. These culture specimens were taken from an area approximately 6-8 x 8-10 cm. From the mothers, skin scrapes were taken from the normal-looking skin in the region of the vulva. The scales were transferred directly to the culture plate and distributed over the entire plate.

The growth medium used contained neopeptone (Difco) 10 g/l, Bacto agar (Difco) 18 g/l, glucose 40 g/l, yeast extract (Difco) 0.1 g/l, glycerol monostearate 2.5 g/l, Tween 80 2 ml/l, and olive oil 20 ml/l; pH adjusted to 6.0. After autoclave sterilization, chloramphenicol (50 mg/l) and gentamycin (100 mg/l) were added. The cultures were investigated macro- and microscopically after 4 days at

37°C. Growth on this medium, as on a closely related medium (4), is seen in 100% when specimens are taken from tinea versicolor lesions and in 90% when specimens are taken from normal-looking skin of adults. Four days of observation had earlier proved sufficient to demonstrate growth of *P. orbiculare* and *P. ovale* (4).

RESULTS

The results are shown in Table II. No lipophilic yeasts were cultured from the mothers, but *Candida albicans* was cultured from 6. The first positive cultures of *P. orbiculare* were found in the 5-year-old children; 10% harboured the organism. In children at the age of 10 years it was present in 23%, and in 15-year-olds, 93% harboured *P. orbiculare*. None of the subjects harboured *P. ovale*, and from the children no other fungi than *P. orbiculare* could be cultured. An isolate was considered to be *P. orbiculare* if it conformed to the descriptions by Sloof, in Lodder's *The Yeasts* (11).

DISCUSSION

In this study *P. orbiculare* could not be cultured in children less than 5 years. In children 5 years of age *P. orbiculare* was found in only 10%, but in 10-year-olds it was cultured in 23%, and in children of

Table II. Number of subjects where *Pityrosporum orbiculare* was cultured from normal-looking skin of children

	Age						
	Mothers (17-39)	Newborn	6 months	1 year	5 years	10 years	15 years
Females	0	0	0	0	2	4	13
Males	-	0	0	0	1	3	15
Total	0	0	0	0	3	7	28

15 years of age the organism was found in the same percentage as in adults (93%) (4, 5, 9). *P. ovale* was not cultured, but as indicated in an earlier study (4) this could be due to geographical variations. Cultures were taken from the back because *P. orbiculare* and also *P. ovale* are found on this site in most healthy adults (4, 9). Skin scrapes from the vulva region in mothers were taken as a control. When a culture from a newborn proved positive, and likewise the culture from its mother, this might indicate that the fungus was transferred to the baby from the mother. *P. orbiculare* was not cultured from the region of the vulva and this may be due to the fact that the mothers had washed themselves carefully before going to hospital and/or that *P. orbiculare* is seldom found in this region. *C. albicans* was cultured from the vulva region in 24% but this can be explained by the fact that the vagina is a reservoir for *C. albicans*, especially during pregnancy. Because of the known high recovery rate of *P. orbiculare* with the medium used, no specimens were taken for microscopy. When screening large groups, this culture method is also easier to handle and the only reliable way of establishing a definitive diagnosis.

P. orbiculare, the etiological agent of tinea versicolor (4), is lipophilic. The sebaceous glands mature and grow during prepuberty and puberty under the influence of androgenic hormones. The sebum excretion rate is significantly lower before than after puberty but it is also higher in the age group 11–15 compared with 0–10 years. Females with established menstruation cycles, aged 11–15, have a significantly higher sebum excretion rate than girls aged 11–15 awaiting the menarche (2). In this study none of the children aged 5 or 10 who harboured *P. orbiculare* had entered into puberty, but 3 girls and 2 boys aged 10 were physically more developed than the average of their own age group. The fact that *P. orbiculare* is seldom found on the skin of infants and makes its appearance during prepuberty, indicates that it is dependent on skin lipids for its colonization. This is in agreement with the observation that tinea versicolor is generally a disease of postpubertal and mature age when the sebaceous glands are most active. Tinea versicolor is also more common in persons with concomitant seborrhoeic dermatitis (4), and children are only seldom affected (4). Although *P. orbiculare* is the aetiological agent of tinea versicolor it is also, as shown in this and earlier studies, a member of the normal

human cutaneous flora (4, 5, 9). It is only under certain endogenous or exogenous conditions that *P. orbiculare* changes from its usual saprophytic yeast phase to the pathogenic mycelium phase (4, 11).

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