

SKIN INFECTIONS IN INFANCY AND CHILDHOOD

A 12 months study in general practice

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OBSERVATION was kept on skin infections in infants and children in general practice in Liverpool. The purpose of the work was to find out the incidence of skin infections, causative organisms, predisposing factors, seasonal occurrence, sensitivity to antibiotics and phage typing of *Staphylococcus pyogenes*.

Methods of observation. Babies from birth and children up to school leaving age suffering from skin infections were investigated. Cases suffering from styes, otitis externa and acne were excluded. The skin lesions were carefully examined. History was obtained from children and parents about possible causes of the lesions. Swabs were taken from the infected material and bacteriological examination was carried out in the Public Health Laboratory in Liverpool. The investigation lasted 12 months.

Results of investigation. The practice is an industrial one of 4,400 National Health Service patients. The population belongs to social groups III, IV and V. There are 1,582 babies and children representing 35 per cent of the practice.

Table I shows the age and sex distribution of skin infections in infants and children. There were 88 cases (50 boys and 38 girls). It is seen that the skin infections decline after the age of 14 years.

Table II shows the classification of skin lesions as seen on examination. Impetigo represents the largest group of 51 cases. There were 19 cases of boils, eight of cuts and abrasions, seven of ulcers and three of paronychia.

Predisposing factors are presented in table III. Despite persistent questioning of parents and children, no apparent reasons for skin lesions were encountered in 33 cases. There were 16 cases who developed skin infections from herpes simplex of the face. Trauma was responsible for 11 cases of skin lesions, including one of an

TABLE I
AGE AND SEX DISTRIBUTION OF CHILDREN
SUFFERING FROM SKIN SEPSIS

<i>Age in years</i>	<i>Male</i>	<i>Female</i>
0—1	1	5
1—2	4	4
2—3	5	1
3—4	2	3
4—5	5	2
5—6	3	4
6—7	2	2
7—8	3	2
8—9	3	1
9—10	5	2
10—11	4	2
11—12	3	2
12—13	4	2
13—14	4	4
14—15	2	1
15—16	—	1
Total ..	50	38

TABLE II
CLASSIFICATION OF THE SKIN LESIONS

<i>Skin lesion</i>	<i>Number of cases</i>
Impetigo	51
Boils	19
Ulcers	7
Cuts and abrasions ..	8
Paronychia	3
Total	88

TABLE III
PREDISPOSING FACTORS OF THE SKIN
SEPSIS

TABLE IV
ANATOMICAL DISTRIBUTION OF THE
LESIONS

<i>The place</i>	<i>Number of cases</i>
Face	37
Legs	16
Hands	8
Buttocks	7
Arms	5
Neck	5
Scalp	5
Feet	2
Trunk of the body ..	2
Axilla	1
Total	88

<i>The factors</i>	<i>Number of cases</i>
No apparent cause ..	33
Herpes simplex ..	16
Trauma	11
Insect bites	6
Napkin rash	5
Urticaria	4
BCG ulcer	3
Eczema	2
Pediculosis capitis ..	2
Unkept hair	
Nail biting	2
Otorrhoea	2
Athlete's foot	1
Burns	1
Total	88

air gun pellet wound. There were three cases of longstanding BCG ulcers of the arms. Pediculosis capitis was responsible for two persistent cases of impetigo of the head. Allergic insect bites caused skin infections in six cases. Scratching of urticaria contributed to four cases of infection. Napkin rashes appeared to be infected in five cases. Two children with chronic otorrhoea also had infections of the face. There were two cases of infected eczema,

two cases of nail biting, one of athlete's foot and one of infected burns.

Table IV presents the anatomical distribution of skin lesions. It is seen that 37 cases had the lesions on the face and five on the scalp. Legs were affected in 16 cases, hands in eight and buttocks in seven. The covered parts of the body were least affected.

Seasonal incidence is shown in figure 1. The peak incidence of skin infections in babies and children is during the months of November, December and January.

Table V gives the bacteriological findings of the skin lesions. *Staph. pyogenes* was recovered from 53 cases, *Staph. pyogenes* and

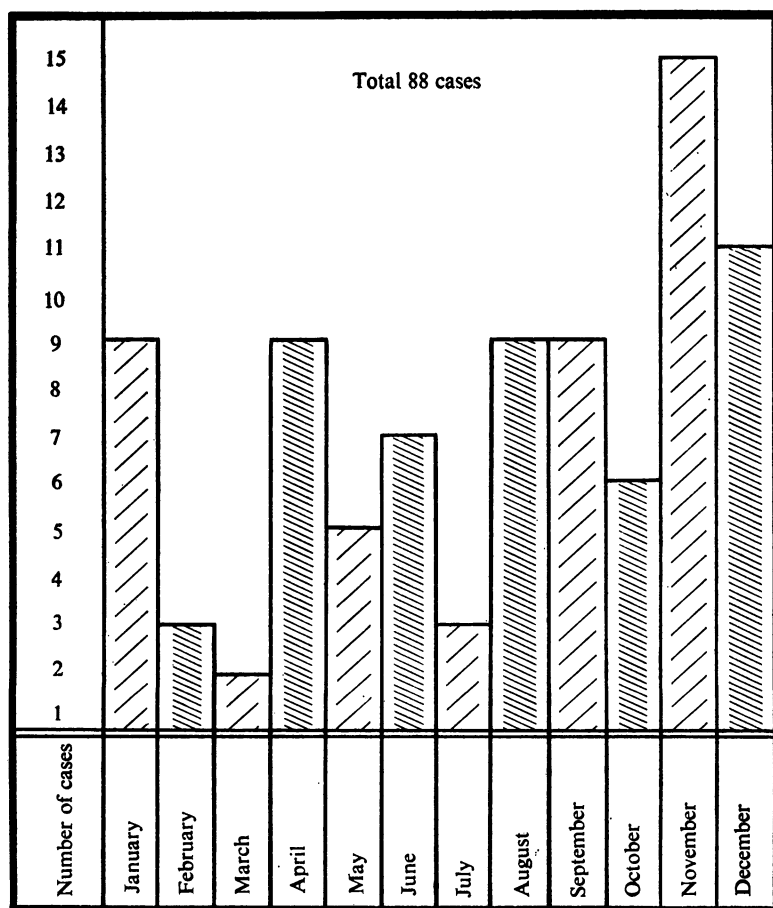


Figure 1. Seasonal incidence of skin sepsis.

Streptococcus haemolyticus in mixed growth were isolated from 15 cases, and *Str. haemolyticus* on its own was found in 12. *Staph. pyogenes* and coliform bacilli were found in two cases. The rest of the skin lesions were infected with *Staph. albus*, monilia, diphtheroids and coliform organisms.

Table VI shows the resistance of the organisms to antibiotics and sulphonamides. *Staph. pyogenes* was found to be resistant to tetracycline in 22 cases and to penbritin (ampicillin) in seven. *Str. haemolyticus* was resistant to sulphonamides in 12 cases and to tetracycline in two.

Table VII indicates the organisms isolated from impetigo lesions. *Staph. pyogenes* was isolated from 31 cases and *Str. haemolyticus* from 12 cases. Mixed growth of *Staph. pyogenes* and *Str. haemolyticus* was found in eight cases of impetigo.

Phage typing was performed in 25 cases of staphylococcal infections. Type 71 was isolated in ten cases. In two no reaction was obtained. The rest of the 13 cases were of mixed phage types.

TABLE V

ORGANISMS RECOVERED FROM THE SKIN LESIONS

Organisms	Number of cases
<i>Staph. pyogenes</i> ..	53
Mixed <i>Staph.</i> and <i>Str.</i>	15
<i>Str. haemolyticus</i> ..	12
Coliform bacilli ..	3
Mixed <i>Staph. pyogenes</i> and coliforms ..	2
<i>Staph. albus</i>	1
Diphtheroids	1
Monilia	1
Total	88

TABLE VI

ORGANISMS RESISTANT TO ANTIBIOTICS AND SULPHONAMIDES

Antibiotics	<i>Staphylococcus pyogenes</i>	<i>Streptococcus haemolyticus</i>
Penbritin ..	7	
Chloromycetin ..		12
Sulphonamides		
Erythromycin ..		1
Streptomycin ..		3
Tetracycline ..	22	

Discussion

Skin infections in infancy and childhood are usually treated by physicians in general practice—only difficult cases are referred to dermatological clinics. This work shows that all ages and sexes are affected, but that infections tend to decrease after the age of 14 years.

Impetigo

The largest group of skin infections was impetigo and it was

found in 51 cases (58 per cent). It is seen from table VII that the majority of impetigo sufferers showed *Staph. pyogenes* in the skin lesions. *Str. haemolyticus* alone was isolated from eight cases. It is seen also that impetigo can be caused by a mixed growth of *Staph. pyogenes* and *Str. haemolyticus*.

TABLE VII
ORGANISMS ISOLATED FROM IMPETIGO LESIONS

Organisms	Number of cases
<i>Staph. pyogenes</i> ..	31
Mixed <i>Staph. pyogenes</i> and <i>Str. haemolyticus</i>	8
<i>Str. haemolyticus</i> ..	12
Total	51

Perlman (1960) describes the various clinical types of impetigo in infancy and childhood. It is important to find out the underlying factors of impetigo and to treat them. Herpes simplex of face was responsible for 16 cases of impetigo. *Staph. pyogenes* was isolated from all of them. Topical application of IDU (5 — iodo — 2¹ deoxyuridine) may offer an effective therapy for herpes simplex in its early stage (Hall-Smith *et al.* 1962). Staphylococcal skin infections can cause keratolysis neonatorum (Ritter's disease) in young infants (Perlman 1960) and skin necrosis (Burton and Sosin 1956). There is evidence that streptococcal impetigo can cause acute glomerulonephritis (Markowitz *et al.* 1956). There were two children in one family who suffered from longstanding impetigo of face due to pediculosis capitis. There were no serious complications of impetigo in this group.

Boils

There were 19 cases of boils (21 per cent). The majority of children suffering from boils were over the age of 11 years. There was one child aged two, one three and one six years old. It seems that the older children have a tendency to localized skin infections. Patients suffering from boils often suffer from allergic diseases (Bendkowski 1961). There were six cases of allergic insect bites, four of urticaria and one of eczema who had boils. *Staph. pyogenes* was isolated from all cases of boils.

Ulcers

There were seven cases of ulcers (8 per cent) among the 88 cases of skin infections. Three of them were due to BCG vaccination. The BCG ulcers were over two months duration. One of them was infected with *Staph. albus*, and two were infected with a mixed growth of *Staph. pyogenes* and *Str. haemolyticus*. Tubercle bacilli were not recovered on culture. One ulcer of leg was due to an air-gun pellet and was infected with a mixed growth of *Staph. pyogenes* and *Str. haemolyticus*. In three cases the napkin rashes

looked ulcerated. *Candida albicans* was recovered from one, and coliform bacilli from the remaining two. *C. albicans* infections of the skin have been discussed by Winner and Hurley (1964), who point out that premature infants are extremely susceptible to thrush of the skin. Swabs should be taken for bacteriological examination from persistent napkin rashes.

Cuts and abrasions

Infected cuts and abrasions were found in eight cases (10 per cent) of all skin infections. Considering that there are 1,582 babies and children in the practice and that minor accidents happen every day, it is surprising how few of them develop skin infections. Mixed growth of *Staph. pyogenes* and *Str. haemolyticus* was isolated from four cases, *Staph. pyogenes* mixed with coliforms was recovered from two lesions. There was one neglected cut of scalp from which coliform bacilli were isolated. In one case diphtheroids were found.

Paronychia

Two cases of paronychia of fingers were due to nail biting, and one case of infected toes due to athlete's foot. *Staph. pyogenes* was isolated from all three cases.

The predisposing factors. These are shown in table III. Impetigo and boils were found superimposed on atopic eczema in one case. There are 25 cases of atopic eczema among infants and children in this practice (Bendkowski 1965). It is known that eczema is often infected with *Staph. pyogenes* (Loewenthal 1954). No cases of infected scabies were observed.

Seasonal influence. November, December and January were the months with peak incidence of skin infections. This time of the year coincides with the peak incidence of winter ailments among babies and children: common colds, sore throats, sinusitis and herpes simplex eruptions. Gould and Cruikshank (1957) showed that most cases of staphylococcal infections in general practice were autogenous and the route of infection was by direct or indirect contact with the nose. Lack of sunshine, cold weather, wearing of more clothing, less frequent baths, spending more time indoors are important contributing factors to skin infections.

Antibiotic and sulphonamide resistance. Fairbrother (1956) showed that 57 per cent of *Staph. pyogenes* infections in hospital and 37 per cent of outpatients were resistant to penicillin. Gould and Cruikshank (1957) found 25 per cent of staphylococcal infections in general practice resistant to penicillin. Penicillin has no place in topical treatment of skin infections and the sensitivity tests to penicillin were not carried out.

There were 22 cases of staphylococcal infections resistant to

tetracycline and seven resistant to penbritin (ampicillin). *Str. haemolyticus* was found resistant to sulphonamides in 12 cases, to tetracycline in three and to streptomycin in one. Antibiotics suitable for systemic therapy should be avoided for topical application as there is a danger of producing antibiotic-resistant strains (Valentine and Hall-Smith 1952).

Phage typing. Phage typing helps to establish the source of infecting organisms. This problem has been studied in the past (Roodyn 1954; Tullock 1954). Phage typing was performed in 25 cases of staphylococcal infections to find out if there is any particular common organism responsible for skin infections in infancy and childhood. *Staph. pyogenes* type 71 was isolated in ten cases. Type 71 is a necrolytic organism typical of impetigo lesions (Armstrong 1965). In two cases no reaction was obtained. The rest of the 13 cases were of mixed phage types.

Summary and conclusion

There were 88 cases (5.5 per cent) of skin infections among the 1,582 babies and children in general practice. The peak incidence of skin infections was noted to be during the months of November, December and January. The incidence of skin infections decreases after the age of 14 years. Boils were more common after the age of 11 years.

The skin infections were as follows: impetigo 51 cases (58 per cent), boils 19 (22 per cent), cuts and abrasions eight cases (9 per cent), ulcers seven (8 per cent) and paronychia in three cases. The importance of herpes simplex is discussed in relation to pyogenic skin infections. The most chronic infections were due to BCG ulcers in three cases and pediculosis capitis in two.

The bacteriological studies showed that *Staph. pyogenes* was isolated from 53 skin lesions (60 per cent), *Str. haemolyticus* from 12 cases (14 per cent), mixed growth of *Staph. pyogenes* and *Str. haemolyticus* was found in 15 cases (17 per cent), *Staph. pyogenes* and coliform bacilli were recovered from two cases. *Staph. pyogenes* alone or in combination with other organisms was found in 70 skin lesions (80 per cent).

The resistance of the organisms to antibiotics and sulphonamides is discussed. Phage typing was performed on 25 cases of staphylococcal infections. References are made to previous works concerned with pyogenic skin infections.

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