THE FALLACY OF THE FURRED TONGUE

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The belief that the general health of a person is reflected in the state of his tongue dates from the days of Hippocrates. In the lay mind this Hippocratic tradition has survived, more or less unimpaired, for some 24 centuries. Most mothers to-day still inspect their children's tongues with care, presumably arrive at certain diagnostic conclusions, and presumably institute appropriate therapeutic measures under the guidance of the local chemist.

In the medical world the concept of the tongue as a trustworthy mirror of health and as an aid to diagnosis in disease has been losing ground steadily during recent decades. Even so, some doubt about the importance or otherwise of a dirty tongue continues to be felt even among experts. One textbook on diseases of the tongue states: "It has been said that the tongue talks in two languages, and that in one it never lies, and that its evidence as an indication of health is not to be gainsaid. From the earliest times a mysterious sympathy has been thought to exist between the appearances of the tongue and the state of the alimentary canal, as if the tongue were a mirror or divining-glass in which is revealed the state of the bowels. In modern times this association has often been laughed at and decried, but he would be a brave man who would state that the patient with a furred or coated white tongue would not benefit considerably from a blue pill or a black draught" (Fitzwilliams, 1927).

Another standard work on the tongue is more sceptical: "The superficial appearances of the tongue are no longer regarded as the mirror of diseases of the intestinal tract, but as indicating local disease of the mouth" (Spencer and Cade, 1931). The authors go on to say, however, that "free eating and drinking overnight produces a thickly furred tongue next morning as the result of slight gastro-enteritis causing a check to the normal secretion of saliva." Lastly, an anonymous expert recently came out strongly for the Hippocratic approach. He suggested that a fur which persisted for 14 years on the tongue of an otherwise healthy man might be due to taking a diet of slops, drinking or eating to excess, blocked nose, constipation, excessive use of aperients, reverse peristalsis, an irritable focus in the alimentary tract, or "a reflex disturbance from elsewhere." He advised a cholecystogram, followed, if negative, by a barium meal and follow-through (with

particular reference to a lesion in the lower ileum), a test meal, and, finally, a gastroscopy to exclude gastritis. He added a warning that treatment might prove difficult, and that "it is not always easy to account for a furred tongue" (*British Medical Journal*, 1953).

Evidently, then, an uneasy feeling lingers on, not only in the minds of the lay public but also among medical men, that there may be, after all, some connexion between a furred tongue and a variety of diseases or states of ill-health.

The Present Investigation

This survey was prompted by the observation that many apparently healthy infants, seen during routine infant welfare examinations (and presumably not given to "free eating and drinking overnight"), had heavily furred tongues. According to textbooks the tongue of healthy infants is almost or completely free from fur because furring is limited to areas bearing filiform papillae. Since these are small and insignificant in the young child, no epithelial scales and micro-organisms adhere to them, and no furring would be expected to occur. The finding of furred tongues in healthy infants led to a routine inspection of the tongue in older children seen in out-patient clinics. There appeared to be no connexion whatever between the state of their tongues and a variety of conditions commonly thought to give rise to a dirty tongue.

To check the validity of this clinical impression the state of the tongue in 750 children was subjected to statistical analysis. The ages of these children ranged from 2 weeks to 14 years. At the time of observation they were not suffering from any general illness or any acute local condition of the mouth and throat.

As Unna (1881) had abandoned a similar statistical survey because of the great variation in the pattern of fur seen, a simple classification of "tongue clean," "completely

TABLE I.—Incidence of Clean or Furred Tongue in Relation to Certain Clinical Findings and Symptoms (for Explanation see Text)

	Tongue Clean	Tongue Furred		Total
		Whole	Back	
Number of cases	282	281	187	750
A. Tonsils red, enlarged	53 (66)	75 (66)	48 (44)	176
B. Tonsils clean, enlarged	149 (131)	104 (130)	94 (86)	347
C. Nose blocked	50 (40)	38 (40)	19 (27)	107
D. Glands present	90 (88)	80 (88)	64 (58)	234
E. Appetite bad	41 (49)	56 (49)	33 (32)	130
F. Bowels costive	27 (30)	33 (30)	19 (19)	79
G. Diarrhoea	9 (7)	8 (7)	2 (5)	19
H. Teeth, two or more carious	56 (50)	44 (49)	32 (33)	132

furred," and "furred at back only" was adopted. These three categories were then grouped against certain local (oro-naso-pharyngeal) and general symptoms and signs which are said to lead to furring of the tongue (Table I).

The figures bracketed in the table indicate the number of clean or dirty tongues which would be expected in each

TABLE II.—Incidence of Clean or Furred Tongue Related to Final Diagnosis and Certain Symptoms and Signs (for Explanation see Text)

	No. of Cases	1A	1B	2	3	4	5	6	7	8	9	10	11
Total No.	750	133	168	129	104	40	32	14	21	60	28	8	13
Tongue furred:													
Whole	281	46 (50)	62 (63)	50 (49)	41 (39)	19 (15)	15 (12)	4 (5)	13 (8)	16 (22)	10 (10)	3 (3)	2 (5)
Back	187	41 (33)	37 (42)	25 (32)	27 (26)	3 (10)	9 (8)	3 (4)	4 (5)	23 (15)	7 (7)	2 (2)	6 (3)
Whole or back	468	87 (83)	99 (105)	75 (81)	68 (65)	22 (25)	24 (20)	7 (9)	17 (13)	39 (37)	17 (17)	5 (5)	8 (8)
Tonsils red	176	41 (31)	45 (40)	25 (30)	17 (24)	5 (9)	7 (8)	5 (3)	4 (5)	14 (14)	7 (7)	3 (2)	3 (3)
Tonsils clean	347	63 (61)	77 (78)	39 (60)	62 (48)	18 (18)	18 (15)	6 (6)	8 (10)	30 (28)	16 (13)	3 (4)	7 (6)
Nose blocked	107	34 (19)	34 (24)	7 (18)	15 (15)	6 (6)	3 (5)	1 (2)	1 (3)	3 (8)	2 (4)	0 (1)	1 (2)
Glands present	234	79 (42)	60 (53)	20 (40)	22 (32)	9 (12)	8 (10)	7 (4)	4 (7)	16 (19)	7 (9)	2 (2)	0 (4)
Appetite bad	130	31 (23)	36 (29)	21 (22)	16 (18)	7 (7)	4 (6)	2 (2)	2 (4)	6 (11)	4 (5)	0 (1)	1 (2)
Bowels costive	79	16 (14)	9 (18)	30 (14)	8 (11)	2 (4)	3 (3)	1 (2)	2 (2)	4 (6)	2 (3)	0 (1)	2 (1)
Diarrhoea	19	2 (3)	2 (4)	10 (3)	3 (3)	0 (1)	0 (1)	0 (0)	0 (1)	1 (2)	1 (1)	0 (0)	0 (0)
Teeth, two or more carious	132	25 (23)	36 (30)	17 (23)	13 (18)	6 (7)	11 (6)	3 (2)	2 (4)	12 (11)	5 (5)	0 (1)	2 (2)

section if there were no association between the state of the tongue and the particular symptom or sign in question. It will be seen that only in sections A, E, and F is the proportion of total cases with tongue furred (whole or back) greater than the "expected" proportion, which might indicate a positive association between the symptom or sign and a furred tongue.

Statistical analysis, using the formula for determining the standard error in a binomial probability distribution, shows that as regards E and F the difference in proportions is not significant, and may be due to chances of sampling. In the case of A it appears that the probability of the difference in proportions being due to chance is only 2%. It must be remembered, however, that this relationship is selected from eight possible relationships as the one with the lowest probability of being due to chance. Thus the difference in the proportions cannot be looked on as the value of a standard normal variate, but must be considered as the largest member of a set of eight standard variates. Under these circumstances the probability level is not 2% but about 14% to 15%. It follows that the difference may be due to chance, and the figures do not indicate any association between a furred tongue and the presence of large red tonsils.

It therefore seems that there is no connexion between the presence or absence of fur on the tongue and the state of the tonsils, the nasal airway, the presence of cervical glands, the presence of carious teeth, the appetite, or the state of the bowels.

The second part of this investigation attempts to link the state of the tongue with the various medical or surgical conditions which were the original reason for the children's attendance at the clinic. As stated above, the children were not acutely ill, and a considerable number of normal children, seen in infant welfare clinics, are included (under section 3).

The various diagnoses are grouped under 11 headings (Table II):

- 1A. History of upper respiratory tract infection.
- 1B. History of lower respiratory tract infection (follow-up of primary tuberculosis, pertussis, and pneumonia; stridor).
2. Digestive system (constipation, herniae, "tongue-tie," feeding errors, healthy infants, worms).
3. Emotional (tics, nightmares, sleeplessness, anxiety, behaviour problems, stutter, cyclical syndrome).
4. Skeletal (knock-knee, bow-legs, pigeon chest, postural defects, obesity, "growing pains").
5. Cardiovascular (follow-up of rheumatic hearts, exocardial murmurs, congenital hearts).
6. Blood disorders (follow-up of anaemia, erythroblastosis, haemophilia).
7. Skin (warts, naevi, urticaria, dirty umbilicus, alopecia, moles).
8. Nervous system (epilepsy, history of convulsions, nervous headaches, spastics, follow-up of birth injury).
9. Genito-urinary (enuresis, phimosis, hypospadias, hydroceles).
10. Trauma (cephalhaematoma, sterno-mastoid tumour, post-concussional state, bruises).
11. Congenital (mongols, cranial and other bone dystrophies, syndactyly, talipes).

Again the figures in brackets represent the number of children with a particular state of the tongue or a particular symptom which would be expected to be found if there were no more than a chance association between that state or symptom and the particular diagnosis for which the child was seen.

The possibility of a positive association between a furred tongue and a given diagnosis arises only in sections 1A, 3, 5, and 7. Using the formula for standard error in a binomial probability distribution, it appears that, contrary to general belief, there is merely a chance association between a furred tongue and a history of upper respiratory tract infection. Also, as common sense would suggest, any association between a furred tongue and emotional upsets, heart murmurs, and skin lesions is purely accidental.

Summary

A deep-rooted belief exists in both lay and medical minds that a dirty tongue, in a child not suffering from an acute illness, is of significance.

Statistical analysis of the state of the tongue in 750 children shows that there is no connexion between a furred tongue and the state of the tonsils, the teeth, the presence of a free nasal airway, the presence of cervical glands, a poor appetite, or the action of the bowels.

Similarly, no association can be demonstrated between the state of the tongue and a variety of abnormalities ranging from tongue-tie to tics and from murmurs to mongolism.

I am grateful to Miss E. L. Parsons and Mr. J. F. Davison for their help in analysing the statistics collected for this investigation.

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RESPONSE TO SCHICK TOXIN IN NATURALLY IMMUNIZED INDIAN CHILDREN

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Sensitization to the stimulus of antigen is an important property of active immunity. The degree of this sensitization in active antidiphtheritic immunity may in some cases be so high that even such a small quantity of antigen as is contained in one Schick test dose of toxin may stimulate production of antitoxin (Bousfield, 1945). In India, natural antidiphtheritic immunity seems to be highly prevalent (Lahiri, 1953). How far this immunity was associated with antigenic sensitization has been worked out in a small-scale field trial. In this small group of Indian children, increase of circulating antitoxin and the Schick conversion rate, two weeks after their first Schick test, have been shown to be so high that it was thought worth while reporting these results.

Materials and Methods

The Schick test toxin was a sterile dilution of a mature crude diphtheria toxin. The parent toxin was prepared in veal-infusion-proteose-peptone broth, and then stored for over four years in the cold. The toxin contained approximately 40 Lf per ml. and 15 LD₅₀ per Lf. Dilutions of this toxin were made in sterile buffered saline of pH 7.6. The Schick test dose, administered in 0.2-ml. volume, contained 1/50 LD₅₀ and 1/750 Lf.

The Schick test was read in a slightly different way. The subjects were all dark-skinned; hence development of an indurated area, at least 10 mm. in diameter, was the only criterion available for positive reaction. There was desquamation of epidermis over the indurated area a few days after the test. The heated control was also used as usual, but allergic reactions were rare.

Antitoxin titrations were done in rabbits following Jensen's (1933) technique. The human sera were tested against Lf/100 dose of the test toxin. The levels of antitoxin titre, at which the sera were tested, were 1/100, 1/20, 1/5, 1/2, 1, and 2.