

Electrogustometry in Hansen's Disease (Study of 225 Cases)¹

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Leprosy is a systemic disease affecting the cooler parts of the body, especially the skin, peripheral nerves, and the upper respiratory tract. Except for the central nervous system, the bacilli may be found anywhere in the body (¹). The olfactory, trigeminal, and facial nerves are the only cranial nerves involved in leprosy (⁴). Paralysis of the facial nerve occurs in 3% to 5.7% of the cases (^{3,9}), and bilateral facial nerve palsy is three times more common than unilateral palsy (⁵).

Loss of taste is a unusual feature (²), and is not given much significance since the systemic manifestations take precedence; thus, it is rarely reported. Tongue involvement is seen in 17% to 25% of lepromatous leprosy cases (⁸), and histopathological evidence of lepromatous granulomas beneath intact surface epithelium has also been reported (⁷). Thus, it is reasonable to assume that this disease will produce impairment of taste as well. In view of this, a study was carried out to assess the status of taste sensation in Hansen's disease.

MATERIALS AND METHODS

This study, comprising 225 diagnosed cases of Hansen's disease, was carried out in the Department of Otolaryngology of the M. G. Institute of Medical Sciences, Sevagram, India. There were 75 cases each of lepromatous, borderline, and tuberculoid leprosy, and the duration of the disease varied from 2 months to 32 years. The cases were grouped as per international classification based upon the immunological status of each patient (¹⁰), five groups along a spec-

trum with lepromatous and tuberculoid at the two ends and borderline at the midpoint. For the purpose of analysis, the first group was lepromatous (LL and BL), the second group was borderline (BB), and the third or tuberculoid leprosy group was BT and TT. In addition, 30 normal individuals in the same environment were studied as the control group. Subjects having systemic disease such as tuberculosis or diabetes or those individuals with a history of head injury were excluded. All of the subjects underwent a detailed examination with special emphasis on the nose, throat, and ear.

The taste threshold was determined with the help of a conventional battery-operated electrogustometer based upon Krarup's design. The procedure was explained to the subjects before testing. The cathode was tied on the forearm of the subject over a piece of gauze soaked in saline (hypertonic). The anode was applied over the lateral margin of the moist tongue 1 cm behind the tip of the tongue. A 100 μ amp stimulus was given for 1 sec so that the subject experienced a distinct acid taste. Testing was started at 0 μ amp and increased in steps of 5 μ amp until a definite acid taste was perceived. The other side of the tongue was similarly tested after washing the electrode, and five readings were taken on each side, the average of which was used as the threshold level. The results were classified as normal at readings up to 75 μ amp. The mean threshold value in the control group was 56.77 μ amp; the 95th percentile was 75 μ amp. The criteria used for the classification of impairment of taste is shown in Table 1.

RESULTS

There were 225 cases in the age group of 15–40 years, and the male:female ratio was 2.95:1. Impairment of taste was present in 55.1% of the cases and was maximum in the 36–40-year-old age group (Table 2). There were 168 males of whom 106 (61.3%) showed impairment of taste and of 57 fe-

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TABLE 1. *Criteria used for grading taste impairment.*

Taste loss	μ Amp
Mild	75-100
Moderate	151-200
Severe	201-250
Complete ageusia	>250

males, 21 (36.8%) showed taste impairment, a male predominance ratio of 1.7:1. There were 34 smokers and 191 nonsmokers, with taste impairment present in 94.1% and 48.2%, respectively. Thus, the gustatory threshold was statistically significantly high (χ^2 test, $p < 0.001$) in smokers as compared to nonsmokers.

Taste impairment was seen most commonly in lepromatous leprosy followed by borderline and tuberculoid leprosy. Complete ageusia was seen only in lepromatous leprosy cases (Table 3). The impairment of taste was seen in 44.9% of the cases with duration of disease 0-10 years, 77.1% of the cases with duration of disease 10-20 years, and 84.2% of the cases with duration of disease of more than 20 years. Thus, taste impairment increased with the increase in duration of the disease.

In the lepromatous leprosy cases, 18 had oropharyngeal lesions of which 3 cases had mild loss, 6 had moderate loss, 6 had severe loss, and 3 cases had complete ageusia. In the borderline and tuberculoid leprosy cases, 6 had lesions in the oropharynx, and all of them showed a mild loss of taste. Thus, all cases having oropharyngeal lesions had impairment of taste.

Unilateral facial nerve palsy was seen in 6 cases, 5 of whom had mild loss and 1 a moderate loss of taste. There were 3 cases of bilateral facial palsy of whom 1 case had mild loss and 2 cases had severe loss of taste. Thus, all cases with facial nerve palsy showed impairment of taste.

There were 61 cases with erythema nodosum leprosum (ENL) reaction of whom 39 (63.9%) had taste impairment. Out of 164 cases without ENL reaction, 85 (51.8%) showed impairment of taste. This was not found to be a significant difference (χ^2 test, $p > 0.5$). There was no significant difference between cases taking dapsone (DDS) alone and those cases treated with a combination

TABLE 2. *Gustatory function in various age groups.*

Age group (yrs)	No. cases	Taste impairment	
		No.	%
15-20	52	20	38.5
21-25	33	15	45.5
26-30	35	20	57.1
31-35	39	25	64.1
36-40	66	44	66.7
Total	225	124	55.1

of DDS, clofazimine, and rifampin (χ^2 test, $p > 0.5$) (Table 4).

DISCUSSION

Impairment of taste in leprosy is believed to be an unusual feature. Occasional case reports and only one series of 30 cases are available in the literature (¹²). The present study revealed taste impairment in 55.1% of leprosy cases. It was mainly seen in the age group 36-40 years and in cases having a duration of symptoms of more than 20 years. Hence, we believe that this feature is related to the duration of the disease itself. The higher incidence of impairment of taste in males is attributed to smoking which was seen exclusively in the males.

Taste impairment was seen most frequently in lepromatous leprosy cases (Table 4). This finding is similar to reports of other workers which showed impairment of taste in 40% of leprosy cases, 75% of whom were lepromatous (¹²). The high incidence of taste impairment in lepromatous leprosy may be attributed to the disease being active, poor resistance of the patient, and involvement of the oral mucous membrane. The latter is substantiated by the fact that all cases having lesions in the oropharynx showed loss of taste of varying degrees.

All of the cases having facial nerve palsy, either unilateral or bilateral, revealed impairment of taste. The solitary case of facial nerve palsy with impairment of taste in Hansen's disease reported in the literature had complete recovery following DDS therapy (⁶). However, in the present study, all cases were on antileprosy therapy, and neither ENL reaction nor the type of drug used showed any significant effect on the impairment of taste. Antileprosy drugs such as DDS, clofazimine, and rifampin are not

TABLE 3. Results of electrogustometry in various types of leprosy.

Type of leprosy	Loss								Total with impairment	
	Mild		Moderate		Severe		Ageusia			
	No.	%	No.	%	No.	%	No.	%	No.	%
Lepromatous (LL and BL) N = 75	21	28.0	12	16.0	16	21.3	7	9.3	56	74.7
Borderline (BB) N = 75	29	38.7	6	8.0	2	2.7	0	0	37	49.3
Tuberculoid (BT and TT) N = 75	19	25.3	10	13.3	2	2.7	0	0	31	41.3
Total N = 225	69	30.7	28	12.4	20	8.9	7	3.1	124	55.1

known to affect taste and smell sensations⁽¹¹⁾.

Taste impairment in leprosy cases could be due to atrophy of the taste buds, direct infiltration of the lepra bacillus, or fibrosis, and in complete ageusia there may be involvement of the nerve, or it may be due to the combination of the above-mentioned factors. Further study is needed to correlate the impairment of taste with the bacterial load. A histopathological study to specifically find the site of the relevant lesions will also be necessary.

SUMMARY

An electrogustometric study of 225 cases of Hansen's disease revealed impairment of taste in 55.1% of the cases. It was related to the duration of the disease, and was seen in 74.6% of the cases of lepromatous leprosy, 49.3% of the cases of borderline leprosy, and 41.3% of tuberculoid leprosy cases. Only in lepromatous cases was complete ageusia seen (9.39% of cases). All of the cases having lesions in the oropharynx and those with facial nerve palsy revealed impairment of taste, but it was not related to the type of antileprosy drug used or to the development of ENL reaction.

TABLE 4. Relationship of drugs used for treatment of lepromatous leprosy and impairment of taste.

Drugs	No. cases	Normal		Taste impairment	
		No.	%	No.	%
DDS alone	45	13	28.7	32	71.1
DDS + clofazimine + rifampin	30	6	20.0	24	80.0
Total	75	19	25.3	56	74.7

RESUMEN

El examen electrogustativo en 225 pacientes con la enfermedad de Hansen reveló que hubieron alteraciones gustativas en el 55.1% de los casos. Los defectos gustativos estuvieron relacionados con la duración de la enfermedad y se observaron en el 74.6% de los pacientes lepromatosos, en el 49.3% de los casos intermedios, y en el 41.3% de los casos tuberculoideos. La ageusia completa sólo se observó en el 9.39% de los casos lepromatosos. Todos los casos con lesiones en la orofaringe o con parálisis (nerviosa) facial mostraron disminución de la función gustativa pero esto no estuvo relacionado ni con el tipo de droga antileprosa usada ni con el desarrollo de reacción ENL.

RÉSUMÉ

Une étude électrogustométrique de 225 cas de maladie de Hansen a révélé une altération du goût chez 55,1% des cas. Ces données ont été mises en relation avec la durée de la maladie. On l'a constaté chez respectivement 74,6% des cas de lèpre lépromateuse, 49,3% des cas de lèpre dimorphe, et 41,3% des cas de lèpre tuberculoïde. Une complète ageusie n'a été notée que chez les malades lépromateux, et ceci dans 9,4% des cas. Tous les malades présentant des lésions de l'oropharynx, de même que ceux atteints de paralysie faciale, révélaient une détérioration du goût, mais ceci n'était cependant pas en relation avec le type de lèpre ou des antécédents de réaction lépreuse.

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