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ON ALOPECIA LEPROSA 6

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There are two kinds of alopecia in leprosy, one occurring in the nodular (cutaneous) type, and the other in the macular (neural) type, especially in the tuberculoid variety. Both kinds were described precisely by Mitsuda in 1911 (2). The kind that occurs in the nodular form of the disease has been discussed in recent years in foreign countries.

In Japan, also, some writers have published exclusively on the condition as it occurs in cutaneous leprosy, for the reason that many foreign leprologists when inspecting leprosaria here have insisted that it is peculiarly common in this country and seldom seen elsewhere. Mitsuda, believing that that alopecia also occurs in other countries, advised F. Hayashi to inquire into the matter when he made his world study tour in 1933, and the latter observed cases in Java and South Africa, as shown in his report (1). However, the condition is really more common and severe in Japan than in any other region, and because its pathology has been studied carefully for over twenty years, the authors think it worthwhile to discuss it briefly.

PRESENTATION OF DATA

Two groups of figures are dealt with here. One was collected at the Zensei Hospital by Mitsuda in 1911, and the other was gathered at Aiseien by Nagai in 1935. Both deal with the condition in nodular leprosy exclusively.

Frequency of alopecia.—The total frequency of alopecia among the cutaneous-type cases in the two institutions referred to, and the frequency by sex, are shown in Table 1.

With 162 cases of alopecia out of 206 examined at Zensei (78.6 percent), and 558 cases out of 845 at Aiseien (66.0 percent), the total comes to nearly 70 percent (68.4). This is a vastly higher frequency than has been reported from any other country.

TABLE 1.—*Frequency of alopecia in nodular cases at the Zensei leprosarium (Mitsuda, 1911), and at the Aiseien leprosarium (Nagai, 1935), by sex and in total.*

Sex	Zensei			Aiseien		
	Cases examined	Alopecia		Cases examined	Alopecia	
		Cases	Percent		Cases	Percent
Male	163	131	80.4	645	426	66.0
Female	43	31	72.1	200	132	66.0
TOTAL	206	162	78.6	845	558	66.0

With regard to the difference between the rates in the two institutions, it is to be said that when Zensei, one of the oldest governmental leprosaria in Japan, was opened in 1909 many severe cases were admitted, these being particularly among the beggar lepers. On the other hand when Aiseien was opened, in 1931, many of the patients came directly from their own homes and were less advanced.

It will be noted that there was a slight predominance among males at Zensei, but that the figures for the two sexes were identical at Aiseien.

Time of occurrence of alopecia.—The data on the time after the onset of the disease at which alopecia was stated by the patients to have developed are shown in Table 2.

In the Zensei group a sizable number (6.17 percent) showed this change as early as the first year of the disease. In the largest numbers it occurred in the fifth to seventh years; the total in this period was 27.8 percent of the whole. At Aiseien a smaller but still not negligible proportion (4.3 percent) fall in the first-year group; the largest numbers are in the period from the second to eighth years, the total being nearly 59 percent. A little less than one-half (48 percent) of the Zensei group fell in this age period. The average time in Mitsuda's figures is 7.9 years and in Nagai's figures 6.6 years.

Comparing the data by sex, the Zensei cases show a distinct tendency for earlier development of the condition among females, 35

as against 30 percent among males in the first five years, and 48 as against 29 percent in the second five years. In the Aiseien group, on the other hand, the percentages for the same periods are almost equal, 42 for females and 39 for males for the first five years, and 35 for both sexes in the second five years. As in the figures for incidence at Aiseien, there is no distinct sex difference as regards time of occurrence.

TABLE 2.—Time of appearance of alopecia, by years after outbreak of the disease.

Year after outbreak	Zensei				Aiseien			
	Males	Females	Total	Percent	Males	Females	Total	Percent
1st.....	6	4	10	6.17	22	2	24	4.30
2nd.....	8	1	9	5.56	39	10	49	8.78
3rd.....	7	1	8	4.94	46	13	59	10.58
4th.....	8	1	9	5.56	38	12	50	8.96
5th.....	11	4	15	9.27	33	15	48	8.60
6th.....	11	3	14	8.64	40	11	51	9.13
7th.....	13	3	16	9.87	26	9	35	6.27
8th.....	5	2	7	4.32	36	13	49	8.78
9th.....	7	4	11	6.79	25	6	31	5.56
10th.....	3	3	6	3.71	21	7	28	5.02
11th.....	9	1	10	6.17	25	7	32	5.73
12th.....	6	1	7	4.32	16	4	20	3.58
13th.....	12	0	12	7.41	10	6	16	2.87
14th.....	6	2	8	4.94	13	1	14	2.51
15th.....	2	0	2	1.23	5	0	5	0.90
16th-20th..	10	1	11	6.79	23	12	35	6.27
21st-25th..	3	0	3	1.85	5	2	7	1.25
26th-30th..	2	0	2	1.23	1	1	2	0.36
31st-35th..	1	0	1	0.62	0	1	1	0.18
36th-40th..	1	0	1	0.62	2	0	2	0.36
TOTAL.....	131	31	162		426	132	558	

Comparison of time of loss of eyebrows and alopecia.—In a small proportion of cases alopecia occurred before there was loss of the eyebrows; the percentages are 3.7 at Zensei and 4.1 at Aiseien. In a considerable proportion (43 percent at Zensei, 34 percent at Aiseien) the two occurrences were simultaneous, but in a fair majority (53 percent at Zensei, 62 percent at Aiseien) alopecia occurred after the eyebrows fell.

First site of alopecia.—The parts of the scalp on which the loss of hair began are shown statistically in Table 3.

There is evidently a sex characteristic in this feature. In the females it begins relatively frequently on the forehead; this is evident in both groups of figures, but particularly in those for Aiseien. In the males at Zensei the most common place was in front of the ears; at Aiseien the forehead was most commonly affected first, but in a much smaller percentage than among the females there.

Grades of alopecia.—First grade: rounded areas with incomplete loss of hair are found in front of the ear, above the forehead, and over the parietal region in the male, and in the last two regions in the female. These areas increase in size. They are somewhat similar to alopecia areata, but atrophy of the skin is not seen in leprous alopecia.

Second grade: the denuded areas advance, not by symmetrical enlargement of the original roundish areas but in the form of bands, sometimes with a branching effect. Running horizontally from occiput to forehead, enlarged veins can be felt beneath the alopecic zones, especially the vena temporalis.

TABLE 3.—Part of scalp first showing alopecia; comparison of sexes.

Part of scalp first affected	Zensei				Aiseien			
	Males		Females		Males		Females	
	No.	%	No.	%	No.	%	No.	%
Forehead.....	29	22.1	13	41.9	221	51.9	108	81.8
Before ear.....	60	45.8	11	35.5	69	16.2	14	10.6
Parietal part.....	30	22.9	7	22.6	71	16.7	7	5.3
Behind ear.....	4	3.0	0	0.0	16	3.8	0	0.0
Occiput.....	2	1.5	0	0.0	19	4.5	0	0.0
Indefinite.....	5	3.8	0	0.0	30	7.0	3	2.3
Unknown.....	1	0.8	0	0.0	0	0.0	0	0.0

Third grade: in contrast to the second grade, in which the conspicuous features are the zones of alopecia, in this grade the striking condition is the persistence of bands of hair. These bands lie over the courses of the arteries, mainly the arteria temporalis, though the same condition is seen over the arteria occipitalis.

Fourth grade: alopecia is extreme, even the hair over the temporal artery being lost, though sometimes small numbers of hairs remain over the occipital artery.

The relative frequency of the four grades of change in the Zensei group was, in descending order, third, first, second and fourth. In the Aiseien cases the order of grades was first, second, third and fourth. As stated, the patients admitted to Aiseien were less advanced than those at Zensei.

Lesions of the scalp.—In the first grade of alopecia the scalp is only slightly infiltrated. In the second and third grades there are

diffuse infiltrations. Nodulation appears later. In the Zensei group Mitsuda found that 41.2 percent of the males and 52 percent of the females had either elevated infiltrations or actual nodules. Especially large nodules are often seen over the parietal region, and these sometimes ulcerate and they may even fistulate and become phlegmonous.

Histology.—A feature of leprous alopecia is that the hair falls over the veins and persists over the arteries, and corresponding differences are seen in the histological changes in these regions. Since these vessels are situated in the subcutis they can have no direct relation to the loss of hair; the cause must be the leprous infiltration of the corium and subcutaneous fat tissue that occurs.

With regard to the arteries, as for example the arteria temporalis, the small branches in the subcutis and among the sweat glands show little leprotic change. To the contrary, however, the arterial capillaries of the hair papillae in the denuded parts are so greatly affected that they cannot be traced; they are obliterated or replaced by leprous infiltration. Even in parts from which the hair has not fallen the hair papillae are affected, and often in their neighborhood there are seen bacillary conglomerates that compress the arteries and ultimately cause their disappearance. This leprotic change in the papillae disturbs the nutrition of the hair and causes its atrophy and destruction.

As for the veins, those in the subcutis always show involvement of the intima by the leprosy bacilli, and perivascular infiltration. This change becomes most marked in the veins of the corium, where the thickening of the intima is often remarkable. The capillary nets under the epidermis and in the lower part of the corium, and also among the sweat glands and in the fat tissue, are engulfed by leprous infiltration. In the parts of the scalp where the hair remains the infiltration is less marked; here it is divided into lobes by strands of connective tissue which, however, will be destroyed by pressure of the infiltration as the process goes on, as are the sweat glands and the fat tissue as well.

As in other organs, the infiltration in the scalp begins in relation to the capillary network and capillary loops, later affecting the larger venous capillaries and ultimately the subcutaneous veins. The bacilli have an affinity for the venous capillaries and the larger venous vessels in the subcutis, and multiply in connection with them. The arteries are not suitable for the multiplication of the bacilli, with the exception of the arterial capillaries in the hair

papillae. The low pressure and slow velocity of the venous blood stream are certainly the principal factors in the explanation of the affinity of the bacilli for the veins, another reason being that the veins have abundant perivascular lymph spaces, in which large globi are often seen.

CONCLUSIONS

1. Leprous alopecia, which is much more common in Japan than in tropical regions, was first studied by Mitsuda in 1911. The data gathered by him then at the Zensei hospital, together with similar data collected by Nagai on a larger group of less advanced patients at Aiseien, are presented. In total the condition was found in 68.4 percent of 1,051 cases of nodular leprosy.

2. When well advanced, leprosy alopecia is remarkable for its occurrence chiefly over the course of the larger veins, the hair persisting for a long time over the arteries. Veins, because of the low pressure and slow velocity of the blood in them, and the abundance of perivascular lymph spaces, are more suitable than arteries for the multiplication of the leprosy bacillus and the development of leprosy infiltration.

3. Loss of hair follows atrophy of the hair roots, caused by pressure of the leprosy infiltration in and around the hair papillae and consequent malnutrition of the hair structure.

REFERENCES

- (1) HAYASHI, F. Report of a leprosy study tour. *Internat. Jour. Lep.* 3 (1935) 165-180.
- (2) MITSUDA, K. [On leprosy alopecia.] *Tokyo Ijishishi* (1911) No. 1711.

DESCRIPTION OF PLATE

PLATE 23

- FIG. 1. Leprous alopecia, first grade, approaching the second grade.
- FIG. 2. Second grade alopecia in a female.
- FIG. 3. Advanced second grade alopecia, approaching the third grade.
- FIG. 4. Typical third grade alopecia, the course of the temporal artery being marked by persistent bands of hair.
- FIG. 5. Late third grade alopecia.
- FIG. 6. Beginning of the fourth grade of alopecia.

