A study was carried out with a group of Indian children to see whether prophylaxis of otitis media could be instituted. A long-acting sulfonamide and the results of this pilot demonstration are reported below. Some aspects of a more precise study design are discussed by the authors.

PROPHYLAXIS FOR OTITIS MEDIA IN AN INDIAN POPULATION

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THE LARGE NUMBER of draining ears and earaches in Indian children caused us to seek a prophylactic. It seemed that a sulfa drug would be the most satisfactory. We believed that Sulfamethoxypyridazine, a long-acting sulfa drug manufactured by Lederle Laboratories under the trade name of Kynex would be acceptable.[1] The Lederle Laboratories furnished the drug and assisted in suggestions for dosage. The Research Laboratory of the Montana Deaconess Hospital of Great Falls, under the direction of Dr. Ernst Eichwald, ran the blood sulfa determinations and bacterial sensitivity tests; the Montana State Board of Health Laboratory, under Edith Kuhns, also did some of the sensitivity tests.

It was decided to give Sulfamethoxypyridazine to all children who had not reached their 11th birthday by November 1, 1957. It was planned to give it from that date until June 1, 1958. Actually, two were included who were 11 shortly before that date. A history of draining ears or earaches in previous years was taken. In the Montana climate earaches of short duration, which are not considered to be otitis media, occur due to exposure to cold. To rule out this condition, an earache was defined as one which lasted all night. Here otitis media is used to denote an infection of the middle ear, resulting either in draining ears or in an earache of one night's duration.

The small number of children and the uncertainty of how many would carry out the program made a control program unfeasible. It was felt, however, that other patients on the welfare medical rolls or those who did not continue the medication could constitute a control group. A questionnaire was filled out on 130 non-Indian children of the same age group who were on the welfare medical rolls to serve as a control group. Although the incidence of draining ears in the control group was one-third less prior to the study year, it was felt that this would not detract from the value of the control group as long as this was kept in mind.

Since many of the Indian population were on the medical welfare program, these groups are somewhat comparable.

The following dosage was used Monday. Wednesday, and Friday:

Weight Pounds	Tablet	Syrup Teaspoon
20– 40	¼	½
40– 60	½	1
60– 80	¾	1½
80–100	1	2
100	1¼	2½

Less than 20 lbs—½ tsp. twice a week

Although it was known to err on the low side, for the sake of safety, it was hoped that it was sufficient to maintain blood sulfa levels of 5 to 15 mg per cent as total sulfa.

Results

The public health nurse in the district became seriously ill and was incapacitated after April 25, so the program ended five weeks earlier than was originally planned.

One hundred and twenty-four children were in the study. Ninety-five of these had not had draining ears previous to the study. Twenty-nine, or 23 per cent had had draining ears previously, while 14.6 per cent of the control group had not previously had such a condition. It seemed logical to divide the study group into two parts; viz. (A) without previous draining ears, and (B) with previous draining ears. Of the 95 without draining ears previously, four moved and could not be followed.

A. Of 91 without previous draining ears who could be followed (see chart):

Thirty-four or 37 per cent took the medication regularly until April 25. None had draining ears or earaches.*

Fifteen took the medication irregularly.† There were none with draining ears and one with an earache, or about 7 per cent. (The latter child very seldom took it; in fact so seldom that we considered placing him in the group not taking the medication.)

Thirty-six stopped medication before April 25. There were two with draining ears and six with earaches, or 22 per cent with some type of otitis media; but none occurred less than two weeks after stopping.

Six did not take the medication at all. Two had draining ears, or 33 per cent.

In the control group, of those without previous draining ears, 7.2 per cent had draining ears this year (1958).

B. Of the 29, in the study group, with draining ears in previous years, 16 had had several repeated draining ears and four had them in two different years. Nine had draining ears in only one year, but five of these were less than two years old, so there was no opportunity for the experience of a second winter. The results this year (1958) are as follows:

Eighteen took the medication regularly; 15 had no otitis media this year; three had drums that had been destroyed or mutilated, and a chronic mixed infection. (Mothers reported an improvement over previous years.)

Three took medication irregularly, none with draining ears, or earaches.

Seven stopped medication before April 25. There were three with draining ears, one of whom had no ear drum. There were two with earaches; one of these took the medication only when the ear ached, not otherwise. All symptoms in this group occurred several weeks after medication was stopped.

One did not take medication and had no otitis media this winter. In the study group 14 per cent of those with draining ears previously had them this year, compared to 63 per cent in the control group.

If we then consider the 19 who had otitis media this year (1958), we find:

Three took Sulfamethoxypyridazine regularly. All three had previously mutilated or destroyed drums, showed mixed infections, and had had continuous drainage most of their lives. One of these had drainage lessened in amount, one had one earache and was fretful, and one pulled at her ears which had a foul odor, but no visible drainage. All three were small children who had had rather severe lead poisoning the previous spring. The family of the two children without drainage had not been

* This includes four who were out of medication for eight days, but took it conscientiously before and after this period.

† Those who continued to take the medication occasionally throughout the program, and did not go without the medication more than two weeks.

completely deleaded, and adult members complained of severe muscle and gastrointestinal pains. This condition rather than the ear could have caused the irritability.

One took the medication irregularly and had earaches but no drainage.

Thirteen stopped taking medication from two to several weeks prior to the onset of otitis media. Five of the 13 had draining ears. Eight simply had earaches. Three of the five with draining ears had had them in previous years, one of whom had previously destroyed drums.

Two took no medication and had draining ears.

Breaking this down further into eight who had draining ears and 11 who had earaches, we find:

Of the eight who had a draining ear this year (1958):

One took Sulfamethoxypyridazine regularly, but had both drums destroyed previously and a mixed infection, as well as a previous lead poisoning.

Five stopped taking the medication two to several weeks prior to the onset of draining ears; three had had drainage previously.

Two did not take the medication at all: neither had had draining ears previously.

Of the eleven who had earaches only:

Two took the medication regularly. They had mixed infections, mutilated drums, and had had previous lead poisoning. One had one earache. The cases were doubtful because symptoms may have been due to incompletely treated lead poisoning.

One took the medication irregularly: it was noted as "very seldom," and possibly should have been in another group.

Eight stopped taking the medication. One of these took it only when he had earaches and possibly should have been placed in the group that was not taking medication. Since he had had draining ears previously, one might surmise that the medication prevented the drainage.

Table 1—Prophylaxis for Otitis Media in an Indian Population

Those Without Draining Ears in Previous Years

Groups	No.	Per cent	Otitis Media This Year		Earache Only		Draining Ear	
			No.	Per cent	No.	Per cent	No.	Per cent
Total Study Group	91	100	11	12	7	8	4	4
Took regularly	34	37	0	0	0	0	0	0
Took irregularly	15	16	1	7	1	7	0	0
Stopped taking	36	40	8	22	6	17	2	5
Did not take	6	7	2	33	0	0	2	33
Control Group	111	100	14	13	6	5	8	7

Those with Draining Ears in Previous Years

Groups	No.	Per cent	Otitis Media This Year		Earache Only		Draining Ear	
			No.	Per cent	No.	Per cent	No.	Per cent
Total Study Group	29	100	8	28	4	14	4	14
Took regularly	18	62	3	17	2	11	1	6
Took irregularly	3	10	0	0	0	0	0	0
Stopped taking	7	24	5	71	2	28	3	43
Did not take	1	3	0	0	0	0	0	0
Control Group	19	100	12	63	0	0	12	63

In addition to the statistical data, there are related incidents which should be mentioned. The Welfare Medical Service and two of the otologists in Great Falls reported a greater incidence of otitis media in the rest of the population than they had seen in several years.

Fairly early in the winter the Medical Welfare Service noticed an improvement in Indian health conditions. In previous years, Indian medical care had consumed the major part of the medical funds. During this winter, Indian medical care was only a negligible part of the total Welfare Medical Service load. The Service reported that not nearly as many Indian children were coming to their outpatient clinics for ear infections as there had been in years before.

In one family of six children, the oldest child was over the age limit for the program, and, through a misunderstanding, the youngest child, an infant, was not placed on the medication. In this family the oldest boy and the infant developed a draining ear, but none of the other four children had an earache. The infant was placed on Sulfamethoxypyridazine immediately; afterwards it had no more trouble.

Some of the comments of the mothers were very enthusiastic. The mother of one child who had had a draining ear several times a year almost the year around stated, "The running ear cleared up within two weeks after the medication given and he has had no trouble since." Another commented, "He has taken Kynex all winter and has not been sick." The mother of a 15-month-old youngster whose four siblings had all had earaches commented, "Has been taking Kynex all winter and has had no earaches."

There are some areas in which there may have been errors which we should point out. First, had this been a better controlled program, we should have made only one change, which would have been the establishment of the Sulfamethoxypyridazine program. However, with the usual zeal of public health persons, several other health programs had been started in the Indian population six or seven months prior to this program and were still being carried on. Some of these programs were Child Health Conferences, health education on nutrition and tuberculosis, improvement of the water supply, and a discovery of about 25 children and several adults with lead poisoning due to the burning of battery boxes. These programs may have had some effect in reducing the incidence of ear infections, but probably not as great as the medication itself.

Second, there was one failure in that only 43 per cent of the persons continued the medication until the end of the program. Part of this was due to our inability to lighten the load of the nurse working on this particular project, so that she not only had people with different customs and a new project, but also a district as large as any of the other nurses. If we were to repeat this, it is possible that the nursing load could be reduced. We would also carry on group education among the school-age children.

Third, we would more carefully determine the blood levels and the minimum dosage that might be given. The blood sulfa levels which we obtained were generally very much lower than we expected. Only a few determinations were made and the chief concern was to see that the levels were not too high. Instead of achieving levels between 5 and 15 mg per cent total sulfa, we found levels closer to 2 mg or even less. It may be that this small amount is all that is necessary to prevent otitis media. This is something to be investigated further.

Fourth, we purposely did not use controls among the Indian population. If this program is repeated, we hope it will be possible to obtain such controls. The Indian mothers who participated in this

program have been so enthusiastic about the results that they probably could not be persuaded to have their children serve as controls. There are a few Indians living in other parts of the city who might serve as controls. However, the Medical Welfare Service which has been watching the results, has become so convinced that it is considering placing all of its clientele on such a program next year, so it may not be possible to obtain controls in that group.

Throughout this study, one point was stressed which should not be overlooked. The use of the medication was not allowed to substitute for an adenoidectomy to prevent otitis media if such surgery was indicated. The one difficulty is that there seems to be much disagreement among experts as to when an adenoidectomy is indicated.

No toxic effects of Sulfamethoxypyridazine were observed in the dosage used.

Summary

A study was made of the prophylaxis of otitis media through the widespread use of Sulfamethoxypyridazine (Kynex).

In children who had not had draining ears previously it was shown to be completely successful if taken regularly according to the dosage schedule used. None of the study group who took the medication regularly had earaches or draining ears, but 12.6 per cent of the control group without previous draining ears had otitis media this year.

It was shown to be successful in preventing otitis media in children who had had draining ears, provided the drums had healed.

In children where the drums were destroyed or badly mutilated it is less successful, but has proved valuable in a small number of cases in suppressing drainage.

Although the study group had had one and a half times as many children with draining ears in previous years as the control group, in the year the study was done the entire study group, whether or not they took the medication regularly, had only 6.6 per cent (8 of 120) with draining ears, while the control group had 15 per cent (20 of 130).

Sulfamethoxypyridazine should not be used as a substitute for an adenoidectomy when one is indicated.

REFERENCE

1. Boger, William P.; Strickland, Clyde S.; and Gylfe, Julia M. Sulfamethoxypyridazine (Kynex)—A New Long-Acting Sulfonamide. Antibiotic Med. & Clin. Therap., III, 6:378-387 (Nov.), 1956.

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