

SPECIAL ARTICLE

SHIGELLA TYPES FOUND IN ANKARA (An Analysis Of 332 Isolated Strains)

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In a previous paper (Akman, 1961), we presented an analysis of 108 *Shigella* strains isolated from children between September 1957 and September 1960. These were discussed on the basis of their types, the monthly distribution of isolations, and the frequency of isolations for different age groups. After the publication of this information this institution became a Faculty of Medicine, and we were able to obtain specimens from adults as well. By the end of 1964, the number of *Shigella* strains isolated reached a total of 322.

Though reports of *Shigella* types in Turkey, dealing with rather smaller numbers of bacteria, by various research workers (Irdelp, 1946; Riza, 1915; Unat, 1940; Çelik, 1940; Braun, 1942; Braun, et al, Aalantar, 1951; Noyan, 1956; Simmons, 1954) still keep their historical value as our first reports on the subject, the analysis of 332 strains give much more comprehensive information on the incidence of different *Shigella* types in Ankara. Probably this same information, with little change, would suffice for the country as a whole, since strains isolated from patients coming from different parts of Turkey are included. The number analyzed in this report is the largest figure we have had on this subject within the past fifty years in Turkey.

During this period (September 1957 to December 1964) there were no significant changes in the media, technique, or personnel in the *Shigella* isolation work, nor in the number of stool cultures performed each year. Repeated isolations are not included in this paper.

We hope that this information will be helpful in drawing the general picture of the distribution of *Shigella* types in Turkey.

Materials and Methods

Samples : Fresh fecal specimens and rectal swabs taken from outpatients or patients in our own clinics were examined.

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Media : (Endo + SS) or (Endo + McConkey) combinations were streaked with samples without dilution.

Procedure : (TSI) and (Tryptone broth) tubes were inoculated with agar slant cultures of suspected colonies to determine the basic biochemical properties and Indol production. On the basis of reactions noted, slide agglutination tests were made using polyvalent and type - specific sera. When the reactions were doubtful, detailed biochemical examinations were performed. For culture media, Difco's dehydrated material (Difco Manual, 1953) were used and for agglutination tests, Lederle's commercial diagnostic sera were used.

Results

A total of 332 *Shigella* strains were isolated between September 1957 and December 1964. It is not material to mention the number of stool examinations performed during that time nor the rate of positive isolations as this was not a previously planned epidemiological study and all types of patients were subjected to stool cultures, regardless of *probable* diagnosis. On the other hand, we do think that in a country in which different types of diarrhaes are prevalent, a diagnosis of bacillary dysentery on clinical observations alone would not be significant without a positive stool culture. We may say that the numbers of stool cultures performed each year were with slight variation about the same.

The monthly distribution of *Shigella* isolations is shown in Figure 1.

The number of strains isolated each year are shown in Table 1.

As can be seen in this table and also in Figure 2, out of 322 strains, 269 (81 % of the total) were *Sh. flexneri*, 50 (15 %) *Sh. sonnei*, 9 (2.7 %) *Sh. dysenteriae*, and 4 (1.2 %) *Sh. boydii* types.

As part of this study, 142 *Sh. flexneri* strains were typed, and 74 of them proved to be *Sh. flexneri* - 2b (52.1 %), 25 (17.6 %) type 3, 11 (7.7 %) type 1a, 10 (7 %) type 1b, 8 (5.6 %) type 2a, 7 (4.9 %) type 6, 6 (4.2 %) type 4a, and finally, 1 (0.7 %) variant-y.

There were no strains of types 4b, 5, and variant-x.

To make comparison easier, these observations are also shown in Figure 3.

Out of 9 *Sh. dysenteriae* strains isolated, 5 were type 1 (*Sh. shigae*), 2 were type 2 (*Sh. schmitzii*), and 2 were type 6 (Large-Sachs), and all of the 4 *Sh. boydii* strains were type 2.

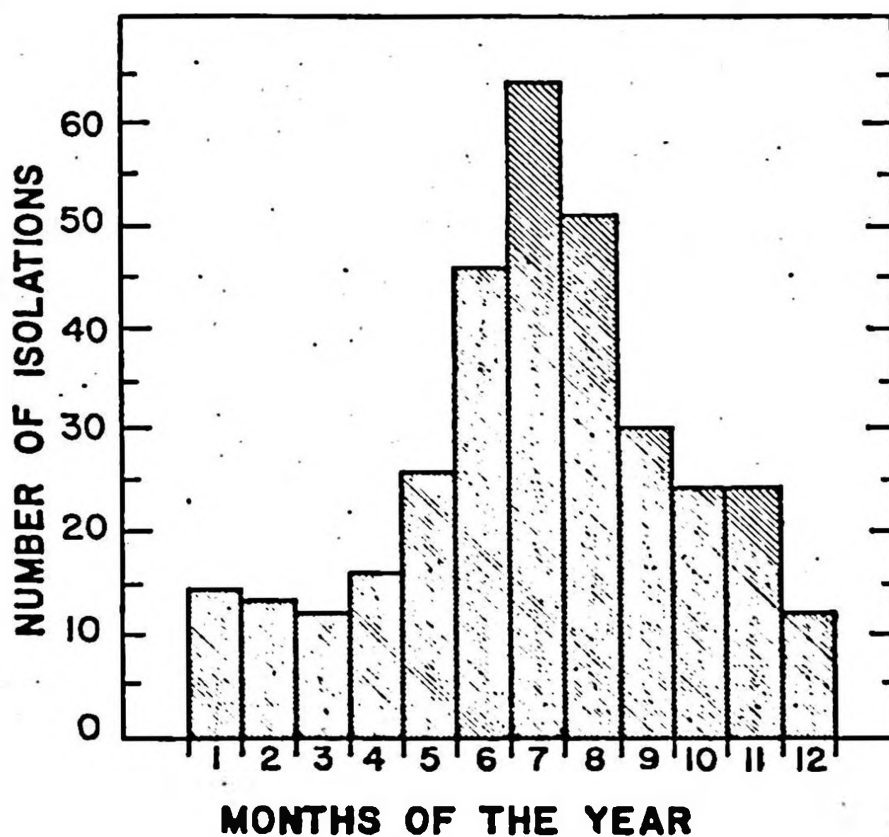


Figure 1. Monthly Distribution of 322 Shigella Strains Isolated.

TABLE 1
THE NUMBER OF ISOLATIONS PER YEAR

Years	Total Strains Isolated	Number of Strains Isolated			
		Sh. dysenteriae	Sh. flexneri	Sh. boydii	Sh. sonnei
1957	2 *	1	1	—	—
1958	54	3	44	1	6
1959	8	1	5	—	2
1960	68	—	60	1	7
1961	40	—	30	2	8
1962	73	1	58	—	14
1963	65	2	50	—	13
1964	22	1	21	—	—
TOTAL	322	9	269	4	50

* This small figure is due to the fact that our laboratory started to work in the middle of September 1957.

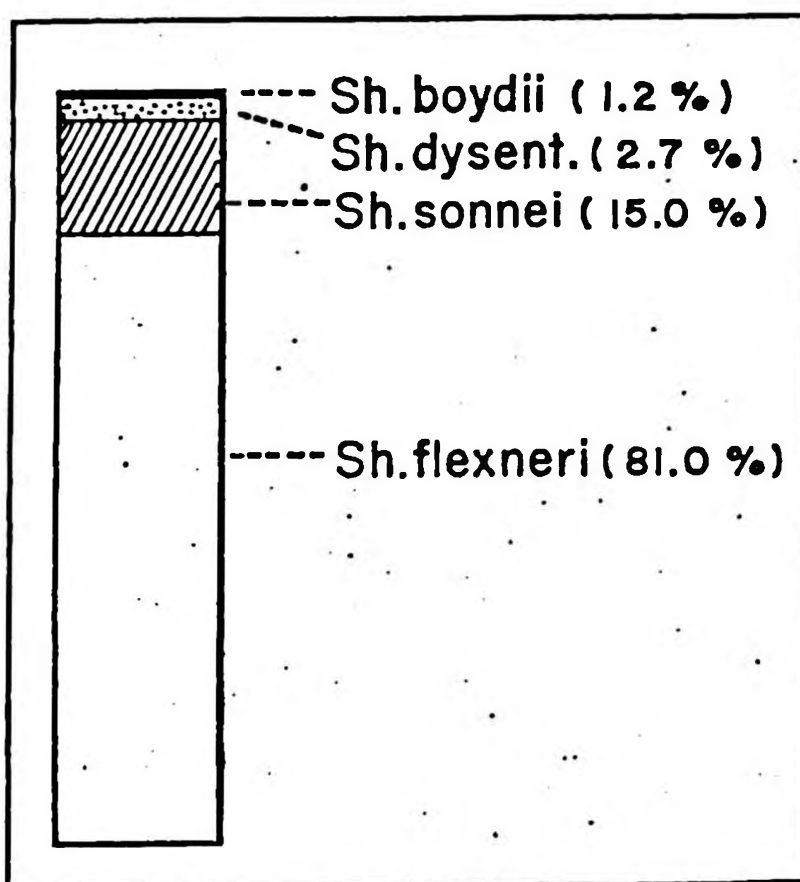


Figure 2. The incidence of various types found in 322 strains of Shigella.

In this country, newborn babies are undoubtedly coming into close contact with Shigellae in their early life, since 220 of the strains were isolated from children (from birth to 2 years) and seven of the isolations were made from babies (7 to 35 days old).

Discussion

The continuation of Shigella isolations throughout the year (Figure 1) suggests that Shigellosis is endemic in Ankara and never disappears even during the coldest months of the year. This is a combined result of a number of factors which we will not discuss here. Certainly, as is seen in Figure 1, the number of Shigella strains (and the number of clinical cases) increases during the summer months as would be expected in the light of our knowledge of the epidemiology of Bacillary dysentery.

As seen in the table, with one or two exceptions, the number of strains isolated each year were comparable. The low figures for 1959 (i. e., 8) and 1964 (i. e., 22), are difficult to explain as there was no decrease in the number of stool cultures performed during those years, nor any change in the materials, methods, or personnel

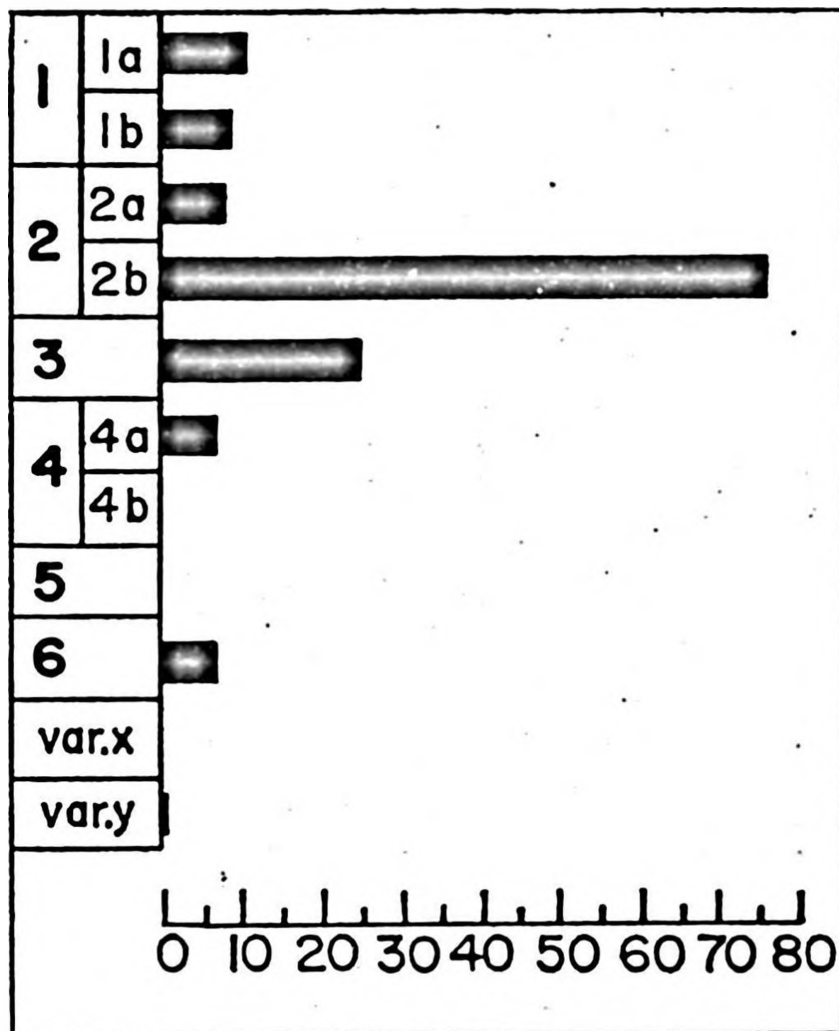


Figure 3. The types and sub-types of *Sh. flexneri* strains isolated, 142 strains. The figures on the bottom indicate the numbers of types.

of our laboratory. They might reflect some fluctuations in the number of Shigellosis cases in the area. The table also shows that there is no consistent pattern for the distribution of different *Shigella* types during this period.

As previously reported (Akman, 1961), *Sh. flexneri* types still occupy the first place among the types isolated, with 269 isolations (81 % of the total strains isolated). In our first report on 108 strains, this rate was 81.4 %, and, for the strains isolated in Ankara during the summer months of 1959 and 1960 from different sources, such as human bacillary dysentery cases, water and sewage, it was reported to be 75.7 % (Akman, et al, 1961). The rates given by various authors on the incidence of *Sh. flexneri* strains in this country, depending on rather small numbers of bacteria, varies from around 60 % to 90 % (Irdelp, 1946; Alantar, et al, 1951; Simmons, et al, 1954). It will be noted in the Table that this rate never falls below 62 % and fluctuates between 62 % and 95 % according to the year. These

observations clearly indicate that the relative incidence of *Sh. flexneri* types among the Shigella types isolated in this country are fairly constant and make it logical to suspect that no significant change would be expected in the frequency of these strains regardless of the number of Shigella strains isolated, unless there were an unusual epidemic caused by another type. This conclusion could be applied to all Turkey. This situation seems very similar to the situation elsewhere in Europe and the Middle-Eastern countries.

Sh. flexneri types are followed in frequency by *Sh. sonnei* with 50 isolations (15 % of the total strains isolated), *Sh. dysenteriae* types (9 strains or 2.7 % of the total), and finally by *Sh. boydii* types (4 strains or 1.2 % of the total). In the four groups of Shigella, C and A groups were less important than the B and D strains in the etiology of Shigellosis (4 and 9 for the former and 269 and 50 for the latter).

Sh. flexneri-2b occupies the first place among the single Shigella types since, out of 142 *Sh. flexneri* strains typed, 74 or 52.1 % proved to be this type. It is necessary to mention that all of the 269 *Sh. flexneri* strains were not subjected to typing. However, if we made the assumption that there were no *2b* strains among the remainder of the non-typed 127 *Sh. flexneri* strains (an unlikely one), this type would still be the most prevalent among the total strains isolated with 74 or 22 % of the total. In decreasing order come *Sh. sonnei* with 50 isolations (15 %), probably followed by *Sh. flexneri 3* with at least 25 isolations (7.5 %). Other types of Shigellae have about an equal role in the etiology of bacillary dysentery in Ankara.

It was interesting to observe that the relative frequency of different Shigella strains in different races in the same community was quite different. Berkman observed that among the Shigella types isolated from the American community living in Ankara, *Sh. sonnei* was the most prevalent. Out of 32 strains, 17 were *Sh. sonnei* and 11 were *Sh. flexneri*, although he used relatively the same technique and material in his laboratory (Akman, 1961). The causes of this discrepancy are still unknown though it is probable that the use of special water, separate markets and dairy plants could make a difference on the etiologic agent of Shigellosis.

Summary

The analysis of 332 strains of Shigella isolated in the Microbiology Department of the Hacettepe Faculty of Medicine in Ankara

within the last eight years is presented on the basis of the types, sub-types, and monthly and yearly distribution of isolations.

According to this data, *Sh. flexneri*, type 2b is the most prevalent type among the Turkish inhabitants of Ankara, followed by *Sh. sonnei* and *Sh. flexneri-3*. The role of *Sh. dysenteriae* and *Sh. boydii* strains in the etiology are small in comparison. Among the Americans living in Ankara, *Sh. sonnei* isolations are more frequent than *Sh. flexneri* types.

The continuation of isolations throughout the year suggests that the nature of the disease in Ankara is endemic. On the basis of the fact that the isolations were made from patients coming from all over Turkey and also according to information reported by other investigators, the author suggests that the incidence rates for different *Shigella* types might be about the same for the country as a whole.

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