

**Epidemic Salmonella Javiana Infection  
in Newborn Nursery in  
Chulalongkorn Hospital**

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Salmonella javiana was first described by Edwards and Bruner<sup>(1)</sup> in 1942 from Eijkman Institute in Batavia. They isolated two strains labelled Salmonella panama var 4657 and Salmonella panama var 7341, from a stool specimen of a child affected with gastro-enteritis. To these strains, the antigenic formula IX (L,V) -1,5- was described. Since these two strains were identical, only one of them was described by the authors. Subsequently, two other strains, N 112 and N 140 were isolated from human carriers in Panama by Sinclair.<sup>(2)</sup>

The organisms possess morphological cultural and biochemical reaction generally elicited by members of the genus Salmonella. Glucose, maltose, trehalose, arabinose, xylose, cellobiose, rhamnose and sorbitol are fermented with production of acid and gas. Lactose, sucrose, dulcitol, inositol, adonitol and salicin are not fermented. The bacilli produce hydrogen sulfide but do not form indol nor they liquify gelatin. Dextro-tartrate,

levo-tartrate, mucate and citrate are fermented but meso-tartrate is not utilized.

They belong to Salmonella group D of the Kaufmann White classification and are represented by an antigenic formula (1), IX, XII -: 1, z28 - 1,5 -

An outbreak of acute diarrhea in newborn infants occurred in newborn nurseries in Chulalongkorn Hospital during May, 1968, to September, 1968, and among various organisms isolated, Salmonella javiana was the sole most common causative agent producing the epidemic of the disease.

**Materials and Methods**

Fresh fecal specimens were obtained by rectal swabs, or from fecal material collected in sterile containers. Most of the initial and all of the follow-up cultures were done in the bacteriology laboratory, Chulalongkorn Hospital. Stool specimens were streaked on Salmonella-Shigella (S.S) and Mac Conkey agar plates and simultaneously inoculated into tetra-

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thionate enrichment broth. After incubation at 37°c for 18- to 24 hours, plates were examined and an average 3 suspicious colonies were fished out and inoculated onto triple-sugar iron (T.S.I.) agar slants. The tetra-thionate broth was subcultured onto S-S agar and carried out through the above manners. Final salmonella identification was based on biochemical and serologic reaction as outlined by Edwards and Ewing. Serotypes were identified by Dr. F.M. Burkhardt, advisor for Bacteriology and Serology, Department of Medical Sciences, Ministry of Public Health.

**Results:** During the five-month period (May-September, 1968) a total of 46 isolations of *S. javiana* were obtained from 330 cases of diarrhea in newborn infants. The number of cases per weeks during the period is present in Fig. 1.

In Fig. 2, shows the age of onset of diarrhea. The lowest age was 1 day, and the oldest, 12 days; the commonest was between 4-5 days. Only 37 of 46 cases were the complete records obtained.

Comparison of number of patients suffering from acute diarrhea in newborn infants caused by *S. javiana* and other organisms is given in Table 1. The total cases of diarrhea per month as compare to total deliveries show a strikingly high percentage as shown in this Table, running from 5.18% in June to 6.75% in May.

From this study, it is found that acute diarrhea in newborn occurred regardless to type of deliveries, normal labour or abnormal. This finding tends to rule out contamination from maternal contact, since in cesarean babies, in prematures and other abnormal deliveries, the infants are usually isolated from maternal contact and they were fed by artificial feeding.

Complications developed in infected infants staying in the hospital more than one week period. The types of complications are shown in Table 2. The most important complication are septicemia and meningitis. Three of the total 8 cases who died during the study were autopsied and the findings showed these complications. Positive cultures in one of this three cases, grew *S. javiana* which was resistant to all antibiotics ordinarily used for sensitivity test in the department of microbiology. The mortality rate of the disease in this series was 17.39% (8 from a total of 46 cases).

Among the eight patients who died, three were examined by autopsy. Two of these three cases died during their acute illness of diarrhea with fever. One was a premature and the other, normal birth delivered at Chulalongkorn hospital. Both contracted the disease during their first week of life while kept in a Newborn Nursery. The morphologic changes in these two cases were similar showing a non-specific ulcerative gastro-entero-colitis. The ulcers were minute, 0.2 mm, in

average diameter. They had undermined edges and contained a few exudate, lymphocytes were dominant (Fig. 3). The lamina propria was edematous containing numerous small and large mononuclear cells, a few neutrophils and rarely, giant macrophages. The villi are flattened and strikingly, there was a marked distortion and destruction of the glandular structures throughout. Goblet cells were markedly diminished. Another case who died of septicemia and suppurative meningitis, 40 days after an attack of acute diarrhea showed no acute lesions in gastro intestinal tract. The lamina propria was markedly thin and the goblet cells were almost absent. There was increase pigmentation of the epithelium.

**Discussion:** The Burkhardt et al Salmonella type javiana is not quite rarely seen in South East Asia<sup>(4)</sup>, although strain typing and cultivation were not given in Burkhardt et al 1968 report. They found 3 carriers of *S. javiana* in total of 6074 persons living in a certain slum area in Bangkok. In their study, 124 strains of Salmonella of 24 different types were isolated.

During its outbreak of this disease in newborn nurseries, no case has been found to occur in adult nor in patients from other wards. Thus, it is surmised that, *S. javiana* was introduced into newborn nurseries by a certain carrier during the first part of May and produced cross-infection

and subsequent epidemics. After the organisms were isolated and tedious care and prompt attentions were carried out, the number of cases fell sharply in July and no case was reported in August. During that period several investigations were also performed in an attempt to find out the primary source of infection. So far none of the methods yielded definite result. Nursery personnel and equipments culture all gave negative growth of *S. javiana*.

*S. javiana* usually causes acute gastro-enteritis manifested by severe diarrhea. Fever and septicemia is common. The incubation period is very short as substantiated by this study (1-12 days) which is also similar to finding in Szanton<sup>(5)</sup> report in which the shortest incubation in his paper was 12 hours. Infection of man is related to four different factors.

1. Personal susceptibility: No known case has occurred in adult in this study. This is realized, of course, that infants are generally considerably more susceptible to *Salmonella javiana* infection than are adults.

2. Duration of stay in hospital of newborn infants delivered by cesarean section, vacuum and forceps extraction is longer than normal delivery—thus there is more risk of direct or indirect contact with a serotype.

3. Quantity of organisms ingested is also important in producing the disease as well as the severity of illness.

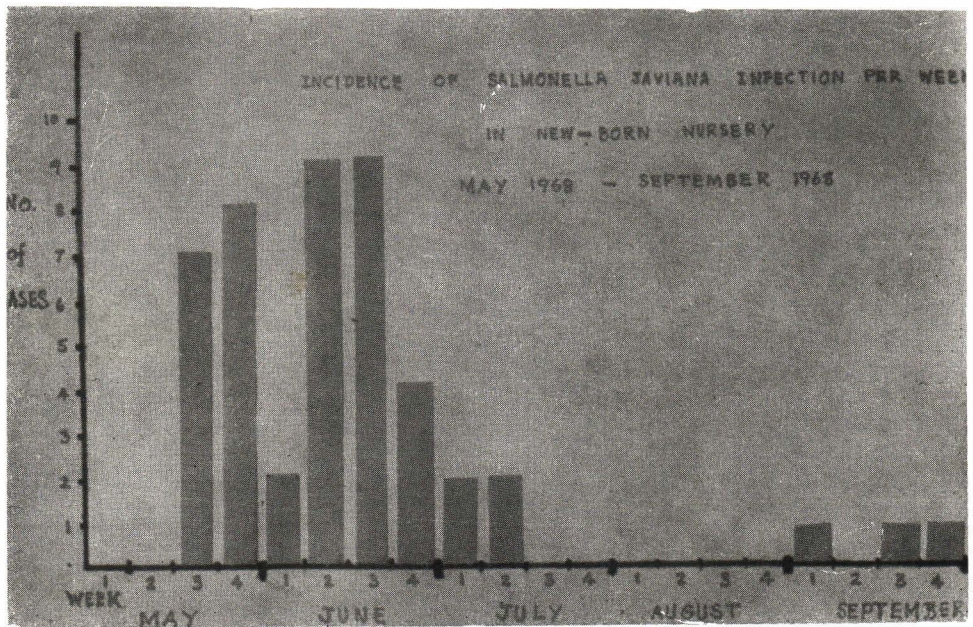


Fig. 1

Incidence of *S. Javiana* infections per week during May to September, 1968.

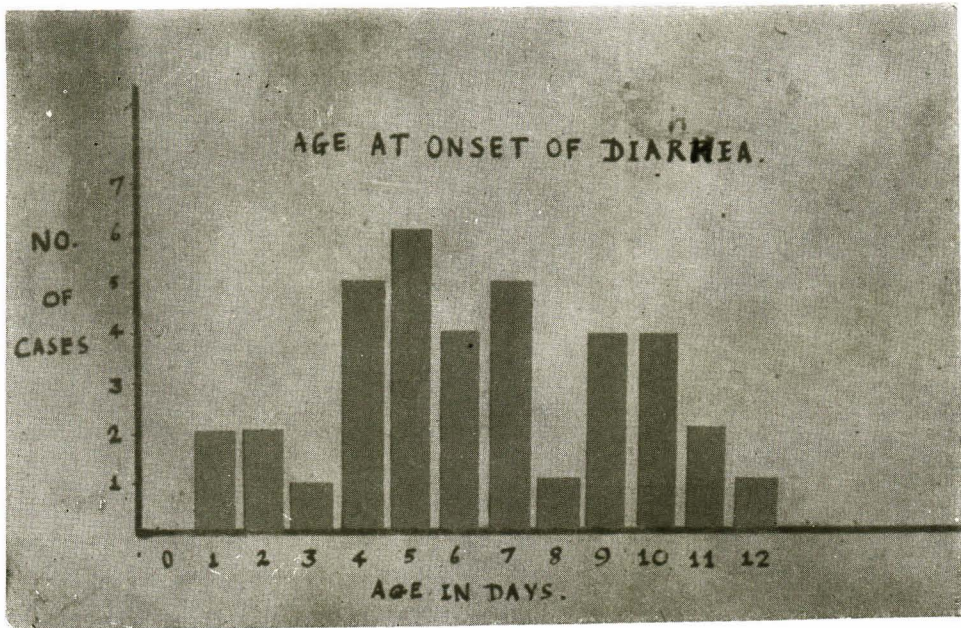


Fig. 2

Age in days of 37 patients at the day of onset of the diarrhea

จำนวนโรคที่เกิดในทารกแรกเกิด และพบเชื้อโรคที่เป็นสาเหตุ

Organisms	May	June	July	August	September
Sal Javiana	15	24	4	0	3
Other Salmonella	3	1	1	0	0
Shigella	2	0	2	0	0
Enteropathogenic Escherichia coli	5	8	9	6	3
Other & Negative	45	21	48	60	60
Total Cases	70	54	64	66	76
Total Deliveries	1037	1042	1102	1133	1213
% of Diarrhea	6.75	5.18	5.79	5.82	6.26

Table 1

Number of newborns which developed bacterial diarrhea per month as Compare to total deliveries

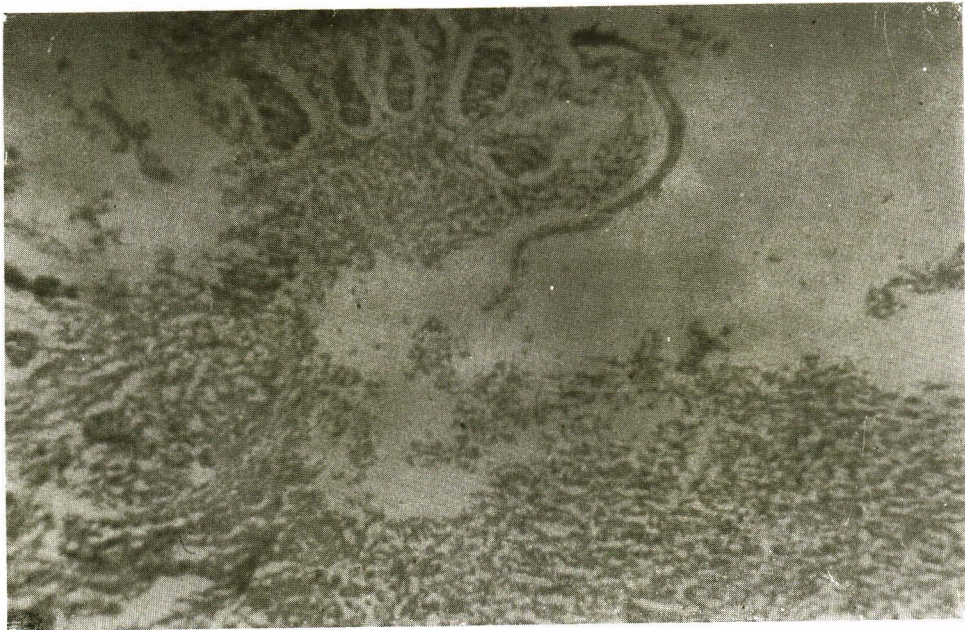


Fig. 3

H & E x 200. Shows an undermined edge active ulcer of large intestine

	No. of Cases
Anemia	1
Malnutrition	3
Bronchitis	1
Pneumonitis	2
Bronchopneumonia	1
Meningitis	3
Septicemia	2
Moniliasis	1

Table 2

Various Complications Occurred during the illness

4. Serotype virulency in likewiess, an important character in producing infection.

The mortality rate of 17.39% is considerably high in comparison to other reports. Saphra and Winter<sup>(6)</sup> found a mortality rate of Salmonellosis as 5.8% for children under 7 years old and 15% in those above 50 years of age, in their series of 7779 cases. Kohler<sup>(7)</sup> reported no death among twenty three cases of Salmonellosis outbreak in a hospital in the United States.

### Summary

Forty-six patients in newborn nurseries of Chulalongkorn Hospital were infected with Salmonella javiana during May to September, 1968. Among these, 8 died of the disease (17.39%). The autopsy was performed in three and a brief main finding are given. During this period, no case had been observed in any other wards. The source of infection was not known, but it was assumed to come from a carrier in ward.

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