

Varieties of Travelling in Epidemiology Methods

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Abstract

We have no evidence suggesting that the causative organism has been carried over any appreciable distance by the waterways themselves. In fact, infection, though often travelling along them, has frequently spread upstream rather than downstream.

Keywords: Cholera; Infection Patients; Contamination; Distant markets; Propagation

Introduction

Certainly, however, water borne traffic was one of the principal means of broadcasting cholera. On the other hand one must not overlook the fact that motor roads and other routes of land traffic generally run parallel with the waterways, the principal settlements lying usually on both. It was thus sometimes difficult to decide by what particular route infection had reached a given settlement [1]. Notwithstanding these objections, one should not categorically rule out the possibility that contamination of water courses with *V. cholera* may be responsible for a spread of the infection to riverine settlements lying a short distance downstream from the originally affected localities. At the same time, however, persons incubating cholera or developing the disease in transit are apt to carry the infection to more distant important towns. Contaminated inanimate objects that fomites like the body- and bed-linen soiled by patients, who may be of some importance in the local spread of cholera, also play a role in the long-distance propagation of the infection seems altogether unlikely. However, certain foodstuffs have been incriminated in this respect. Thus Heiser, dealing with the cholera problem in the Philippines, related that the commencement of the disease in 1902 was ascribed to a shipment of presumably infected Canton cabbage arriving in Manila from Hong kong which, upon being refused landing, was thrown overboard in the harbour, with the result that the whole bay was literally covered with this vegetable. Much of the cabbage was gathered and consumed and within forty-eight hours from the time of its reaching the beach, cases of cholera commenced to appear. Even if one accepts this story at face value, there can be no doubt that a long-distance spread of cholera by contaminated vegetables is exceptional. However, it deserves serious attention that, as has already been discussed earlier in this study, some convincing evidence exists to show that the transport of cholera-contaminated fish to distant markets may be a means of importing the infection. That shellfish may play a similar role is exemplified by observations [2]. The former worker found the fatal infection of a cholera patient in Milan to be due to the consumption of oysters which had been imported from Taranto, while succeeded in isolating cholera vibrio's from two prawns brought from the delta region of Burma to the Rangoon market. During the 1947 outbreak in Egypt a controversy took place regarding the long-distance spread of the infection through date-pulp cakes exported from the cholera-affected areas. The bacteriologists asserted that *V. cholera* remained viable in dates for not more than three to five days, but local health officers reported that new foci in certain regions began with the importation of dates from infected areas, especially Korein and neighbouring localities. As described by Kamal, the date-pulp cakes were certainly prepared in a most unhygienic manner likely to facilitate greatly their contamination. Nevertheless

one must wonder whether they or the persons who brought them were responsible for the importation of the infection into hitherto cholera-free localities. The results of the bacteriologists speak certainly in favour of an introduction of the infection by human agency. Passive transport of flies as claimed by a few observers, for instance, the long-distance spread of cholera may also be affected by the passive transport of contaminated flies, carried, for instance, by railway trains. Certainly, however, such a transfer of the infection, if it takes place at all, must be rather rare as compared with the usual mode of cholera propagation through persons who leave affected localities when already ill or when incubating the disease to fall a prey to it either in transit or after they have arrived at their destination [3].

Discussion

The factors responsible for the speed and the intensity with which such a long-distance spread of cholera through human agency takes place will now be given attention. Spread by infected individuals using various methods of transport In the course of an interesting discussion of cholera epidemiology, Hart and his colleagues pointed out that man can but carry the disease so far as he is able to travel between receiving the infection and being laid low. What we find then, on comparing the march of the earlier epidemics of cholera with those that have occurred in more recent years, is that whereas when travel was slow the disease swept steadily forward, occupying the land as it advanced; in later times it has bounded forward with long strides, occupying outposts far ahead of infected areas by means of railway and steamboat communication, and then from these outlying foci of infection, has spread in both directions, coalescing perhaps at a much later date with the main body of the epidemic which has slowly advanced across country from the earlier centres. While this statement is of great value in so far as it does justice to the ability of cholera to make long-distance sprints if modern means of communication are available, it might give the wrong impression that the slow contiguous spread of the infection is a quite uniform process. Actually, as will be discussed below, in this mode of spread as well initial foci may be created in places particularly suitable for inroads of the infection and from these centres the disease may be

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carried to the surrounding localities. One might thus say that a spread of the infection by shorter or longer relay stages is typical of the propagation of cholera [4]. Though, as pointed out by some authors, first perhaps by Greig, a rapid spread of cholera might be affected by air traffic, as far as the present writer is aware this fear has not been substantiated thus far. It is permissible, therefore, to focus attention upon other means of communication. Caravans dealing with the problem of the spread of cholera by caravans, Dugue stated that the sterilizing effect of caravans has always been stressed. Indeed, upon seven occasions, the caravan of Syria, starting from Medina, left with cholera and the malady became extinct en route without ever being imported into Damascus. However, in a subsequent publication, Duguet, while admitting that as a rule cholera persisted in the Medina caravans only for 10-15 days, the infection could be carried over wider distances by caravans passing through well populated areas. The great importance of railways for the spread of cholera was well illustrated by observations recorded at the 1885 cholera conference by Koch, according to which The Punjab belonged to those parts of India which formerly suffered least from cholera. From the year 1820, in which the first reliably authenticated cholera epidemic came into the Punjab, up to the sixties, i.e., in a period of about 40 years, the province had only 5 epidemics: 1820, 1827, 1845, 1852 and 1855. Then railway traffic was opened. From then onwards a comparatively large number of epidemics followed regularly: 1861, 1862, 1865, 1867, 1869, 1872, 1875, 1879, 1881. Thus suddenly from 1861 onwards the behaviour of cholera in the Punjab became changed. The population remained the same, and the meteorological conditions did not change; only the traffic with the cholera focus in Bengal was accelerated [5]. Agreement with the opinion of Koch that railway traffic played a most important role in the long-distance spread of cholera was expressed by several other early observers, some of whom pointed in this respect particularly to the causation of a quite considerable epidemic at Altenburg in Saxony in 1865 through the arrival of a woman with a cholera-affected child from Odessa in Russia. It is reassuring to note that some of the modern observers are inclined to lay less stress on the role played by railway traffic in the spread of cholera. Thus Napier, dealing with the conditions met with in India, maintained that normal railway travel on business or pleasure does not tend to spread the disease to any great extent on account of the control that can be exercised over passengers, and that, though the sanitary arrangements are far from perfect, especially at the small stations, there are latrines and a safe water supply. Such travellers of course come from all grades of society, but even the poorest are seldom destitute, and the fact that they are travelling usually indicates that they can afford the ordinary necessities of life. While it was always agreed that the local traffic by small craft played an important role in the propagation of cholera, the question to what extent ships undertaking long voyages were of importance for the spread of the infection was in the past the subject of much debate. The anti-contagionists tried to prove that cholera manifestations on sea-going ships were rare and, therefore, of no epidemiological significance [6]. However, as pointed out by Koch (1885), it was wrong in this respect to take into account all cholera-infected ships, including those leaving ports which were only occasionally affected by the disease, instead of focussing attention upon ports like that of Calcutta where the infection was constantly present. More important still, as stated with great reason by Figgie, on well-found ships there were not so many opportunities for the direct transmission of the infection as in the habitations of the less affluent classes of the population. Strict supervision and obligatory cleanliness led on board such ships to a much more thorough abolition of most sources of the infection than was the case in small urban habitations. Secondly, the drinking water taken for the voyage was

either free from comma bacilli from the first or the organisms perished within a few days and there was no occasion for further contamination. Finally, it is far easier to observe the initial cases and to pay early attention to them, than is possible in urban settlements. However, if cholera cases occur in the overcrowded space between decks, kept without adequate control in an unclean state, direct transmission is apt to take place repeatedly, especially among groups relying on common food and living closely together. Moreover, even on well-kept ships protracted epidemics may be caused by accidents, such as incautious treatment of the patients' linen or contamination of certain foodstuffs with comma bacilli. Under these circumstances it is not surprising to find that a by no means inconsiderable number of sometimes quite intensive and protracted cholera outbreaks has been recorded on sea-going ships [7]. As summarized, Most long lasting were the epidemics on the Apollo, which in 1849 had 18 cholera deaths among 593 persons, with the last case on the 56th day after departure; on the Franklin, on which out of 611 between-decks passengers more than 200 showed cholera symptoms and 43 died, and on which the last case occurred on the 33rd day after departure; and thirdly on the Matteo Bruzzo, which left Genoa for Montevideo in 1884 and had, among 1333 persons, 40 cholera cases, the last on the 52nd day after departure. Severe epidemics also occurred on the Leibnitz, which went from Hamburg to New York in 1867 and had 165 cholera attacks with 105 deaths; and on the steamer England, which left Liverpool for New York in 1866 and had until her arrival at Halifax 150 cholera attacks and 46 deaths; 200 further cases were recorded during quarantine at Halifax [8]. While under these circumstances sea-going ships in the past played an ominous role in the transport of cholera infection, it is consoling to note that, as will be discussed in the following of these studies, this danger was afterwards practically abolished through adequate measures of sanitation on board the vessels in combination with implementation of quarantine measures ashore. Group movements and assemblies of the population General considerations Ample experiences have shown that the arrival of groups of people who have come from, or passed through, cholera-infected localities is apt to lead to outbreaks of the disease at the places of their destination; and if the infection is already established in the latter, its spread may receive impetus through the influx of groups of travellers both because, having undergone vicissitudes during their journey, they may fall an easy prey to the disease and because the newly arrived persons are apt to crowd together in un-sanitarily kept quarters and, generally speaking, to lead an unhygienic life. The purpose, and consequently the scope and epidemiological importance, of such movements of the people may vary considerably. Relatives and friends may assemble to celebrate marriage feasts or-what is far more dangerous-to attend the funeral of cholera victims. Groups of people may proceed at regular intervals from surrounding districts to communities where markets are held, the latter thus often becoming the distributing centres of cholera epidemics. As discussed above, in the past in-sanitarily kept ships on which emigrants or seasonal labourers were herded together served as a means of carrying the infection to distant parts, for instance, from European to American ports. While, as has been noted, this danger has been practically abolished, migrations of seasonal labourers on land routes still continue to be responsible for the dissemination of cholera. Thus Mathew, aptly discussing the observations made in this respect in Madras State, recorded that Labour families leave their villages in quest of work and proceed to other localities either in the same district or in the adjoining districts according to the working season [9]. There is absolutely no control over their movements and they live in the fields or by the roadside. They drink any water which is readily available near the work spots and eat any food that they get. Cholera outbreaks are common

amongst them and when infected they take fright and disperse in various directions leaving behind the dead and the suffering. Groundnut picking in the central districts and transplantation and harvesting of paddy in the river irrigated areas attract considerable labour from less fertile regions." However, even the role played in the spread of cholera by the movements of seasonal labourers is overshadowed by far by the influence exerted on 1 As reported by Koch, the introduction of sanitary improvements, particularly the provision of pure waterworks water in place of Hooghly river water in 1874 led to a marked decrease of the cholera incidence on ships leaving Calcutta with coolies for Assam and other ports [10-15].

Conclusion

The spread of the infection by wars, usually involving the movements not only of large bodies of troops but also of hosts of refugees, and by pilgrimages. While sufficient evidence of the epidemiological importance of wars has already been furnished in the first of these studies, the following additional comments on the role of pilgrimages have to be made.

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Conflict of Interest

None

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