BLOOD-GROUP DISTRIBUTION PERTAINING TO ABO, MNSs AND Rh-Hr SYSTEMS IN THE INDIAN SUB-CONTINENT

(An Ethno-Geographical Variation)

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INTRODUCTION

An up-to-date picture of blood group distribution in the Indian Sub-continent is compiled in the tables appended at the end. Apart from the works carried out in India proper, it includes the results of studies conducted in Ceylon, Pakistan, Tibet and Nepal. A similar attempt was made earlier in 1957 by Mourant, A. E., Kopec, Ada C. and Sobezak, K. D. in their book, "ABO Blood Group Atlas". It was a commendable piece of work, all the same, it had its limitation in so far as the information was confined to the ABO system of Blood Groups only. A need was, therefore, felt not only to extend the Blood Group picture to other systems like MNSs and Rh-Hr, but also to revise and re-arrange the ABO data for the Indian sub-continent so as to make it more comprehensive and up-to-date.

In the present compilation of Blood Group studies made in the Indian Sub-continent, it was felt advisable to arrange the data under five major zones, namely: Western, Northern, Eastern, Central and Southern. The delineation of these five zones is made roughly on the basis of ethno-geographical variations encountered in the sub-continent. This arrangement takes into consideration not only the geographical divisions of the subcontinent, but also, to a certain extent, the ethnic variations. The latter are, however, more clearly reflected in the sub-divisions of the forementioned five zones.

DISCUSSION

It will be interesting to study the pattern of gene frequency distribution at the level of caste and tribal groups or their further sub-divisions on the basis of data presented here. It, however, does not fall in the purview of this paper to take up a detailed analysis of Blood Group variation in the sub-continent. The scope of the present paper has been delimited to bringing forth only the salient features of gene frequency distribution pertaining to the forementioned three systems of Blood Groups, namely ABO, MNSs & Rh-Hr.

ABO SYSTEM

As pointed before, this is the most extensively worked out system in the Indian sub-continent. Almost all parts of the Sub-continent can now be said to have been represented on the map of ABO Blood Group distribution, and a fairly good picture of the pattern of gene frequency distribution can be developed from the data gathered so far. A zone-wise analysis can be made as follows:

NORTHERN ZONE

It will be seen from tables appended that all the populations tested in North-West Pakistan, such as Pathans, Hazaras, Baluch and N. W. F. P., as also the populations of Panjab plains, irrespective of the fact whether they have been categorized as Hindu, Muslim, Jat or Sikh, exhibit, without any exception, a higher frequency of B than that of A. Same is the case with the populations of U. P. plains. Though, in the higher caste-groups of U. P., there is a tendency for A to approach more closely the frequency of B, in the low caste groups like Chamars, Bhoksa, Kurmi etc. (M a j u m d a r 1947) the differences are more prominent. A study of the gene frequency distribution reveals a preponderance of gene r with a frequency of 50 % to 60 %. The frequency of q varies mostly between 20 % and 30 %, and that of p between 15 % and 20 %.

An interesting picture of Blood Group distribution is revealed from a study of gene frequency distribution in the Cis-Himalayan populations, which are distributed over the vast stretches of Himalayan ranges running from Himachal Pradesh, Panjab and U. P. Hills in the west, across the small Himalayan kingdoms of Nepal, Sikkim and Bhutan, to N. E. F. A. and Assam Hills in the East. More to the North and bounded by the Himalayan ranges lies the highest plateau of the world — Tibet. The populations of Tibet are not very well represented on the Blood Group map. There are only two studies on record, i.e. of Tennants (C/7: M o u r a n t 1958) and that of B u c h i (1951). The results of the two studies differ widely. Whereas the former presents an extremely high frequency of A (47 %), the

latter reveals an excessively high frequency of O followed by B and A respectively.

A study of gene frequency distribution in the Cis-Himalayan populations presents an interesting picture. It can be observed that, by and large, the populations bordering Panjab and U. P. Plains, particularly in the regions of Chamba, Simla Hills, Rampur Bushahr, Tehri Garhwal, Almora, Kumaon etc., exhibit a higher incidence of B than A. More interiorly, however, there can be spotted certain pockets of isolated groups of people, such as Kinner Kanets of Chini valley (Bhalla 1960) Brahmin and Rajput of Kulu and Katrain (Delhi University 1958), and Upper Castes of Jaunsar Bawar (Banerjee & Kumar 1953), which reveal a higher frequency of A. As we move to the east, the preponderance of A over B takes a more regular course in the mongoloid populations of Nepal, Sikkim, Bhutan and Kalimpong (Macfarlane 1937, 41 and Agar 1946).

EASTERN ZONE

The tendency of higher A than B is met with a still greater regularity, as also, with an increasing difference in the frequency of the two Blood types, as one enters into the domain of head hunting mongoloid tribes of Naga Hills and Abor Hills, situated in the interior ranges of N. E. F. A. There is a consistent preponderance of A over B. Blood Group O, too, occurs more frequently than in the regions more to the west. The Tripura tribes, placed more southernly and less mongoloid in appearance, show varying incidence of A and B, the latter more often registering a lead over the former.

As we enter Bangal the frequencies once again take a turn in favour of Blood Group B. In conformity with the plains populations of Panjab and U. P., the Bangal with its heterogenous population constituted by Muslims, higher-caste Brahmins, Kaysthas, Vaidyas, the Depressed-classes, the Convicts etc., shows with a great consistency a preponderance of B over A, the only exception to this rule being the Anglo-Indians and the Parsees (Macfarlane 1942).

CENTRAL ZONE

The central zone is mainly an area of the Tribals. Obviously, most of the Blood Group studies in this zone are reported on the Tribes of Behar, Orissa, Chhota Nagpur and Madhya Pradesh. There are a number of studies on record on the tribes of Santhal Pargana (Sarkar 1936—1937). They all point to a higher frequency of B than A. The picture is somewhat different in the tribes of Palamau, Kolhan and Singhbum District (Sarkar 1949, 54; Majumdar 1943, 50—51, and Macfarlane 1941) which shows a good deal of variation. For instance, the frequency of A rises as high as 57 % in Asuras (Sarkar 1949), and that of B reaches more than 61 % in Birjias (Sarkar 1954). The tribes of Orissa, Chhota Nagpur and Madhya Pradesh, on the other hand, exhibit with some consistency a higher frequency of B ranging mostly between 30 % and 40 %, but occasionally rising as high as 48 % in Juangs (Sarkar 1956).

WESTERN ZONE

Here too, the data available are mostly on tribes and low castes, but the information on high castes is not very much lacking. In fact, this zone is one of the most extensively worked out areas in the Sub-continent.

There is a good deal variation to be seen in the incidence of A and B in Gujarat. Both the types show a range of variation between 20 % and 40 %. Although the frequency of B is higher in most of the cases, quite often, the frequency of A exceeds that of B.

A similar variation in the frequency of A and B is to be noted in the tribes and high castes of Maharashtra. For instance, the large samples of Bombay Hindus studied by Sanghvi (1944) show a consistently higher frequency of B, though the frequency of A does not lack very much behind. On the other hand, the extensive studies of Karve (1948) and Sanghvi (1954) on Marathas reveal more often than no higher incidence of A than B. Again, whereas, the Blood Group picture of tribes and low castes, such as Fulmali and Koli (Karve and Dandekar 1951), Mahars (Sanghvi 1954, Das et al. 1961) exhibit a higher incidence of B than A, that of the higher castes like V. N. B., Desasth Brahmin, Koknasth Brahmin and Chandrasenia Kayasth Prabhu present little uniformity with respect to the incidence of A and B. There is an alternatively higher incidence of A or B from one population to another.

SOUTHERN ZONE

The southern zone is represented on the map of Blood Groups, both by the tribals as well as the non-tribals. There is to be seen a consistently higher Incidence of B than that of A in both the Hyderabad as well as the Madras states. There are, however, a few exceptions to the general tendency of B exceeding A. The Chenchus of Hyderabad (Macfarlane 1940), for example, exhibit a high frequency of A & O and a very low frequency of B. In Madras the only exception to the rule are Anglo-Indians, who, as elsewhere, show a higher frequency of A than that of B.

The Kerala tribes from Malabar, Cochin and Travancore exhibit a good deal of variation in the frequency of A, B and O. Most often it is A that exceeds B. Occasionally, however, B tends to be more frequent than A.

An exceedingly high frequency of O characterises the Blood Group picture of Ceylon. It ranges mostly between 40 % and 55 %, although occasionally rises as high as 58 % in Burghers of Colombo (Hill 1937). As to the incidence of A and B, the latter appears more frequently than the former in Tamils (Hill 1937, Seneviratne 1944, Koch and Weeratunga 1953, Kirk et al. 1962),

Wannis (Kirk et al. 1962) and Veddahs (Kirk et al. 1962, Hill 1937). The Sinhalese (Kirk et all. 1962, Hill 1937) and Burghers (Hill 1937, Seneviratne 1944), on the other hand. exhibit a higher incidence of A than that of B.

Although a number of Blood Group studies have been conducted on the Andaman Islanders, the highest number of subjects studied so far is only 34 (Sarkar 1952). The results obtained by Sarkar (1952) reveal an exceedingly high frequency of A over B as well as O. The Nicobarese (Sarkar 1952), who have been studied in a greater number, reveal an altogether different picture. Here, both A as well as B occur with a small frequency of 10 % each. Blood Group O is come across most frequently and occurs with a frequency as high as 80 per cent.

MNSs-SYSTEM

The Indian Sub-continent is characterised by a high frequency of gene m and a relatively much lower frequency of gene n. On an average, the frequency of gene m fluctuates between 50 % and 80 %, and that of gene n between 20 % and 50 %. The highest incidence of gene m is come across in the tribes of southern zone, namely Vathuvans (Roy 1955), Ulladan (Roy 1955), Kannikars (Buchi 1955), Paniyans (Lehman & Cutbush), etc. Its frequency in the northern regions, more specifically in the tribes of Central India and the plains' populations of N. W. Pakistan, Punjab, U. P. and Bengal, is much reduced and is replaced by an increase in the incidence of n. As a result thereof, the phenotype MN occurs much more frequently than in the southern zone and quite often exceeds the phenotype frequency of the type MM.

More recent studies of MN System have also included an examination of the S and s antigens. The information, however, is limited only to a small number of populations from different parts of the continent. Whatever data are available, they tend to show a much higher frequency of gene s than that of gene S. The incidence of latter is, however, greater than among any of the Mongoloid or Pacific Ocean peoples. As in Europe, the S gene tends to accompany M rather than N. The frequency of gene S, therefore, tends to be higher in Southern India where we have already noted a high incidence of gene m. The Kurumbas (Kirk et al. 1962), for instance, reveal an extremely high frequency of gene m (82 %) and likewise high incidence of gene S (50 %). Similar occurrence of a high incidence of gene m and gene S can also be noticed in Tamils (Kirk et al. 1962) and, to a lesser extent, in Wannis (Kirk et al. 1962). More populations are likely to fall under this series as the investigations are further extended. In the populations of the northern regions, however, the incidence of gene S rarely exceeds 35 %.

The chromosome frequency distribution reveals a high incidence of chromosome ms, fluctuating mostly between 35 % and 45 %, occasionally rising as high as 58 % in the Todas of Nilgiri Hills (Kirk et al. 1962). The frequencies of chromosome ms appear to be more unstable and fluctuate as widely as 11 % in Kurumbas (Kirk et al. 1962) to 46 % in Veddahs (Kirk et al. 1962). This, however, may be due to the small size of the samples studied for MNSs typing.

Rh-Hr SYSTEM

A series of Rh tests have been carried out with four or five anti-sera in both the tribal as well as the non-tribal populations of the Sub-continent. The knowledge of Rh incidence, though much extended during the recent years, remains patchy and incomplete with wide-spread gaps. Only a broad picture of Rh chromosome distribution can be obtained with the help of the data gathered so far. At the very outset, it can be seen that the Subcontinent, with all its heterogenous populations, presents many differences with respect to Rh genes. There is a complete absence of Rh negative factor in certain tribal populations such as Oraons of Chhota Nagpur (Kirk et al. 1962) and Veddahs of Ceylon (Kirk et al. 1962). In other populations, the frequency of Rh negative shows a good deal of fluctuation. It varies from 0.5 % in Dhankas of Gujarat (Vyas et al. 1962) to 12.3 % in Todas of Nilgiri Hills (Kirk et al. 1962). By and large, the Rh negative factor appears with a greater incidence in the north than in the south. Besides, it also occurs more frequently in the higher castes than in the lower castes. A high incidence of Rh negatives in Todas is no exception to the general trend, in so far as they bear closer ethnic affinities with the populations in the north than with any of the neighbouring populations.

A noteworthy feature of Rh distribution in the Indian Sub-continent is an extremely high incidence of chromosome R_1 (CDe). Its frequency, though mostly fluctuating between 55 % and 70 %, occasionally rises to 80 %. The highest frequency recorded is 85 % in Oraons of Chhota Nagpur (Kirk et al. 1962). A high incidence of R_1 (CDe) along with a moderately high incidence of r (cde), results in a much more frequent appearance of phenotypic combinations CCDee & CcDee than the others. The incidence of CCDee is as high as 68 % in the Riang of Tripura (Kumar and Sastry 1961), and more than 58 % in certain tribes of western zone such as Dhodia, Gamil and Dhanka (Vyas et al. 1962). As to the incidence of CcDee, the highest frequency recorded is 48 % in Todas of Nilgiri Hills (Kirk et al. 1962). The lowest incidence of CcDee is recorded in the Riangs of Tripura (Kumar & Sastry), who also exhibit a complete lack of the chromosome r (cde).

As to the incidence of rare chromosomes, R_2 (cDE) and R_0 (cDe), although their frequency is less than 0.1 % in most of the cases, their appearance is rather consistent. The chromosomes R_z (CDE) and R′ (Cde) are also present in one group or the other, but their incidence rarely exceeds 0.05 %.

People	Total No.	0	A	B	AB	P	q	r	Author
NORTHERN ZONE									
N.W. Pakistan									
Pathans (near Quetta)	150	29.33	31.33	33.33	6.00	.2114	.2244	.5642	Malone and Lahiri 1928—29.
Pathans	336	29.17	28.87	32.14	9.82	.2175	.2387	.5438	Maranjian 1952.
Hazaras	156	39.10	25.64	28.85	6.41	.1760	.1958	.6282	Maranjian 1952.
Hazaras	100	32.00	25.00	39.00	4.00	.1599	.2459	.5912	Malone and Lahiri 1928—29.
Baluch (Quetta)	74	47.2	24.3	24.3	4.2	—	—	—	Malone and Lahiri 1928—29.
Parsees	103	31.07	25.24	33.01	10.68	.1989	.2488	.5523	Moten and Stewart 1956.
Urdu	113	35.40	24.78	37.17	2.65	.1505	.2279	.6216	Maranjian 1952.
N.W. Pakistan (Muslims)	101	27.72	23.76	39.60	8.91	—	—	—	Chaudhary et al 1952.
Peshawar	155	29.68	25.81	31.61	10.43	.183	.261	.554	Boyd 1954.
Other N.W.F.P.	75	25.33	33.33	36.00	5.33	—	—	—	Boyd 1954.
Panjab Plains									
Panjabi Soldiers	262	24.05	15.65	46.18	14.12	.1602	.3658	.4740	Hirszfeld and Hirzsfeld 1919.
Panjab Muslim Soldiers	2.235	31.63	25.86	32.89	9.62	.1967	.2417	.5616	House and Mahalanobis 1939—1945.
Panjab Muslim Army donors	265	31.70	26.79	31.70	9.81	.2036	.2350	.5614	Bird and Krishnaswami 1946—48.
Panjabis	10.000	30.64	24.48	34.78	10.10	.191	.257	.552	Khan 1952.
Total Lahore	228	32.89	21.49	33.33	12.28	.184	.259	.556	Boyd 1954.
Panjabis alone	204	33.33	20.59	32.84	13.24	.215	.252	.531	Boyd 1954.
Panjabis	2.386	30.72	25.19	35.71	8.38	.1858	.2534	.5608	Maranjian 1952.
Hindustani	47	25.53	19.15	44.68	10.64	—	—	—	Maranjian 1952.
Panjab Hindu Soldiers	615	32.36	22.28	34.63	10.73	.1895	.2593	.5602	House and Mahalanobis 1939-45.
Panjab Sikh Soldiers	2.278	35.34	25.24	30.60	8.82	.1876	.2212	.5912	House and Mahalanobis 1939-45.
Sikhs	600	34.17	25.33	33.17	7.33	.1801	.2295	.5904	Bird et al 1956.
Panjabi Khattris	1.708	30.03	21.37	40.63	7.96	.168	.291	.541	Anand 1957.
Panjabi Aroras	1.598	28.91	21.46	41.23	8.37	.171	.299	.530	Anand 1957.
Panjabi Brahmins (Delhi)	402	27.11	25.63	37.81	9.45	.1953	.2753	.5294	Bhalla 1963.
Panjabi Khattris (Delhi)	540	30.00	22.04	39.63	8.33	.1662	.2797	.5540	Bhalla 1963.
Panjabi Aroras (Delhi)	342	28.36	20.18	42.11	9.35	.1608	.3038	.5354	Bhalla 1963.
Comb. Pan. Hindus (Delhi)	1.284	28.65	22.67	39.72	8.96	.1741	.2863	.5396	Bhalla 1963.
Panjabi Hindus	203	26.60	21.18	38.92	13.30	.1818	.2929	.5252	Sharma 1957.
Khattris (Panjab & Kashmir	99	33.30	25.30	30.30	11.10	—	—	—	Malone and Lahiri 1928—1929.
Jats (Panjab and Kashmir)	277	33.20	24.50	35.50	6.80	.171	.240	.576	Malone and Lahiri 1928—1929.
Jats (Rohtak)	93	41.93	22.58	34.41	1.07	—	—	—	Khurana 1956.
Jats (Delhi)	113	30.97	25.66	37.17	6.20	.177	.250	.573	Delhi Iniversity 1962.
Sainis (Panjab)	200	26.00	28.00	32.00	14.00	.2369	.2633	.5099	Singh and Singh 1962.
Rajasthan									
Rajputs	118	28.80	28.00	33.00	10.20	.214	.246	.537	Malone and Lahiri 1928—29.
Hindu Soldiers	111	33.33	21.62	35.14	9.91	.1718	.2576	.5706	House and Mahalanobis 1939—45.
Hindu and Muslims	600	32.50	24.50	35.83	7.17	.1744	.2464	.5792	Goyal and Anand 1955.
U.P. Plains									
Kahttris	125	32.00	24.00	33.60	10.40	.1894	.2508	.5598	Majumdar 1947.
Kayasthas	111	36.04	19.82	32.43	11.71	.1703	.2494	.5803	Majumdar 1947.
Kshatriyas	415	30.84	26.75	32.77	9.64	.2025	.2412	.5563	Majumdar 1947.
Chamars	150	36.67	18.67	29.33	5.33	.1288	.2574	.6138	Majumdar 1947.
Bhoksa	144	30.56	19.44	36.11	13.89	.1808	.2886	.5306	Majumdar 1947.
Kurmis children	107	34.30	20.10	34.30	11.30	.170	.260	.570	Majumdar 1947.
Doms (Gorakhpur)	180	32.78	22.78	39.44	5.00	.1519	.2575	.5906	Majumdar 1942.
Jaunpur	278	34.53	21.94	35.61	7.91	.1626	.2487	.5887	Bhatia et al 1955.
Mainpuri	524	30.34	24.43	34.73	10.50	.1929	.2594	.5477	Bhatia et al 1955.
Shia Muslims	106	35.85	25.47	33.96	4.72	.1661	.2190	.6149	Majumdar 1943.
Sunni Muslims	220	33.18	21.82	33.64	11.36	.1810	.2562	.5628	Majumdar 1943.
Muslims (Soldiers)	109	33.03	21.10	33.94	11.93	.1797	.2616	.5587	House and Mahalanobis 1939—45.
Hindu Soldiers (U.P.)	838	31.15	26.97	34.49	7.40	.1912	.2393	.5695	House and Mahalanobis 1939—45.
Hindus of Agra and Oudh	2.357	30.20	24.50	37.20	8.10	.1799	.2619	.5582	Malone and Lahiri 1928—29.
Lucknow Brahmins	203	31.53	29.06	31.53	7.88	.2070	.2228	.5702	Majumdar 1947.
I.T. College Lucknow	202	34.65	21.78	38.61	4.45	.1454	.2511	.6035	Majumdar 1947.
University students	816	27.94	29.53	35.54	6.99	.2060	.2451	.5489	Majumdar 1947.

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People	Total No.	O	A	B	AB	P	q	r	Author
Cis Himalayan Region of Panjab and Himachal Pradesh									
Lahaulis	57	21.05	17.54	42.1	19.29	—	—	—	Delhi University, 1958
Brahmins (Chamba)	147	24.49	30.61	35.37	9.52	.229	.260	.511	Delhi University, 1959.
Mahajans (Chamba)	112	37.50	21.43	36.61	4.46	.140	.234	.625	Delhi University, 1959.
Aryas (Chamba)	96	23.96	26.04	34.38	15.62	.234	.290	.476	Delhi University, 1959.
Brahmins (Kulu and Katrain)	110	17.27	35.45	32.72	14.54	.2929	.2739	.4156	Delhi University, 1958.
Rajpust (Kulu and Katrain)	268	21.64	34.7	27.61	16.04	.2983	.2494	.4651	Delhi University, 1958.
Kinnar Kanets (Chini Valley)	310	32.90	37.42	22.26	7.42	.258	.162	.579	Bhalla, 1961.
Brahmins (Rampur Bushahr)	58	29.31	17.24	34.48	18.96	—	—	—	Panjab University, 1962.
Rajputs (Rampur Bushahr)	126	29.36	13.49	37.30	19.84	.113	.275	.541	Panjab University, 1962.
Harijans (Rampur Bushahr)	41	12.19	14.63	48.78	24.39	—	—	—	Panjab University, 1962.
Brahmins (Simla Hills)	71	18.31	22.54	40.85	18.31	—	—	—	Delhi University, 1957.
Kanets (Simla Hills)	196	20.92	30.61	27.24	11.24	.273	.291	.457	Delhi University, 1957.
Scheduled Castes (Simla Hills)	95	32.26	29.47	30.53	7.87	—	—	—	Delhi University, 1957.
Cis Himalayan Region of Uttar Pradesh									
Khasa Brahmins	50	32.00	30.00	26.00	12.00	—	—	—	Majumdar, 1951—52.
Khasa Rajput	67	20.00	20.00	20.00	7.00	—	—	—	Majumdar, 1951—52.
Khasa Artisans	108	25.00	24.07	40.74	10.19	.1903	.3012	.5085	Majumdar and Krishen, 1947.
Khasa	246	30.49	30.08	28.05	11.38	.2339	.2207	.5454	Majumdar and Krishen, 1947.
Rajput (Tehri Garhwal)	50	30.00	46.00	10.00	14.00	—	—	—	Delhi University, 1953.
Garhwalis	103	22.33	17.47	50.48	9.71	.1476	.3712	.4812	Hirszfeld, 1919.
Kumaoni Brahmins (Almora)	108	25.93	27.78	31.48	14.81	.2400	.2647	.4952	Tiwari, 1954.
Kumaoni Rajputs (Almora)	124	29.03	24.19	33.87	12.90	.2052	.2682	.5266	Tiwari, 1954.
Kumaoni Doms (Almora)	74	24.32	27.03	40.54	8.11	—	—	—	Tiwari, 1954.
Bhotia (Almora)	144	18.06	15.28	50.69	15.97	.1692	.4187	.4121	Tiwari, 1952.
Rajputs (Kumaon)	104	25.00	30.8	34.6	9.6	.230	.256	.514	Delhi University, 1960.
Kumaon	111	24.32	27.03	34.23	14.41	.2335	.2818	.4847	Bird and Krishnaswami, 1955.
Lower Caste (Dehradun)	162	21.60	30.25	38.89	9.26	.2257	.2845	.4898	Benerjee and Kumar, 1953.
Doms (Dehradun)	125	36.00	20.00	33.60	10.40	.1643	.2495	.5862	Majumdar, 1942.
Bhatus	113	27.40	24.78	39.80	7.96	.1816	.2800	.5384	Majumdar, 1941—42.
Karwals	155	25.8	22.6	40.6	10.97	.1850	.3048	.5102	Majumdar, 1941—42.
Tharus	240	27.08	17.08	37.50	18.33	.1913	.3267	.4820	Majumdar, 1943.
Upper Caste (Jaunsar Bawar)	148	25.67	35.81	25.67	12.84	.2826	.2153	.5021	Benerjee and Kumar, 1953.
Koltas (Jaunsar Bawar)	25	24.00	20.00	32.00	24.00	—	—	—	Delhi University, 1951.
Tibet Nepal and Kalimpong									
Tibetans (Gyantse)	187	14.90	47.10	13.90	24.10	.463	.213	.386	Tennants (c/f, Mourant 1958).
Tibet	150	—	—	—	—	.147	.212	.641	Buchi, 1952.
Bhotias born in Central Tibet	80	38.75	36.25	20.00	5.00	—	—	—	Macfarlane, 1941.
Bhotias mixed with Lepchas (Nepal, Bhutan, Sikim, Darjeeling)	85	36.47	27.07	21.07	15.29	—	—	—	Macfarlane, 1941.
Nepalese (Kalimpong)	78	33.30	34.60	23.10	9.00	—	—	—	Macfarlane, 1937.
Lepchas (Kalimpong)	33	30.30	36.40	27.30	6.06	—	—	—	Macfarlane, 1937.
Gurkhas (Nepal)	2.869	31.8	33.8	25.20	9.2	.245	.190	.565	Agar, 1946.
EASTERN ZONE									
N.E.F.A. and ASSAM									
Lushai Nagas	141	32.62	44.68	16.31	6.38	.3016	.1213	.5771	Mitra, 1935—36.
Angami Nagas (Burma Border)	165	46.06	38.79	11.51	3.64	.2413	.789	.6798	Mitra, 1935—36.

...Contd.

People	Total No.	O	A	B	AB	P	q	r	Author
Angami Nagas (Naga Hills)	100	45.00	38.00	11.00	6.00	.2503	.885	.6612	Bhattacharjee, 1957.
Angami Lahotas, Rengmas and Sema Nagas (Naga Hills)	140	40.00	33.57	22.14	4.29	.2131	.1433	.6436	Br. Assoc. Res. Committee, 1939.
Ao Nagas (Naga Hills)	57	47.37	22.81	22.81	7.02	—	—	—	Br. Assoc. Res. Committee, 1939.
Konyaks (Naga Hills)	127	45.67	40.16	10.24	3.94	.1252	.235	.6744	Br. Assoc. Res. Committee, 1939.
Thado Kuki (Naga Hills)	83	19.28	30.12	32.53	18.07	—	—	—	Br. Assoc. Res. Committee, 1939.
Nocte (N.E.F.A.)	313	41.22	31.14	20.13	3.51	.2184	.1271	.6545	Bhattacharjee, 1954.
Minyong Abor (Abor Hills)	553	35.08	32.55	22.42	9.95	.2403	.1766	.5831	Bhattacharjee, 1954.
Pasi Abor (Abor Hills)	191	19.4	37.7	22.5	20.4	.3463	.2400	.4134	Bhattacharjee, 1954.
Padam Abor (Abor Hills)	754	24.27	36.07	26.00	13.66	.2900	.2224	.4875	Bhattacharjee, 1954.
Pangi Abor (Abor Hills)	197	27.41	45.69	20.30	6.6	.3127	.1466	.5407	Bhattacharjee, 1954.
Galong Abor (Abor Hills)	400	40.75	32.25	20.75	6.25	.216	.145	.639	Kumar, 1954.
Khasis									
Khasis (Khasi and Jaintia Hills)	50	46.6	15.6	33.3	4.5	—	—	—	Basu, 1938.
Khasis (Cherapunji)	200	33.00	35.00	18.50	13.50	.2779	.1726	.5495	Macfarlane, 1941.
Assamese (Dibrugarh and other Areas)	2.000	33.65	24.55	32.55	9.25	.186	.237	.580	Mitra, 1933.
Tripura									
Kaiping	100	38.00	24.00	26.00	12.00	.1971	.2095	.5934	Gupta, 1958.
Morsam	44	18.18	11.36	52.27	18.18	—	—	—	Gupta, 1958.
Rankhal	100	46.00	33.00	15.00	6.00	.2181	.1107	.6712	Gupta, 1958.
Tipperah	150	21.33	41.33	25.33	12.00	.3190	.2097	.4713	Gupta, 1958.
Riang	150	22.00	27.33	37.33	13.33	.2301	.2981	.4718	Gupta, 1958.
Riang	509	19.84	25.15	42.04	12.97	.2147	.3312	.4541	Kumar and Sastry, 1961.
Noatia	142	16.20	28.87	40.84	14.08	.2477	.3327	.4196	Kumar, 1960.
Bengal									
Bengali mixed	311	37.9	19.3	34.1	8.7	.1506	.2422	.6072	Chaudhary, 1936.
Kayasthas	154	38.96	20.78	32.47	7.79	.1543	.2264	.6193	Chaudhary, 1936.
Urban Mohamedans	136	33.10	29.40	30.90	6.60	.200	.209	.575	Macfarlane, 1938.
Bengali Muslims (Budge Budge)	120	28.30	23.30	40.00	8.30	.174	.282	.532	Macfarlane, 1938.
+Bengali Brahmins	200	35.50	29.50	29.50	5.50	.211	.211	.595	Macfarlane, 1938.
+Bengali Kayasthas	200	32.00	23.00	37.5	7.50	.176	.268	.565	Macfarlane, 1938.
Brahmins and Kayasthas (Budge Budge)	100	43.00	17.00	29.00	11.00	.1490	.2217	.6293	Macfarlane, 1938.
Non-Caste Hindus (Budge Budge)	320	30.94	22.19	40.00	6.87	.1589	.2731	.5680	Macfarlane, 1938.
Mahisyas (Budge Budge)	160	32.50	20.00	39.37	8.12	.5124	.2757	.5719	Macfarlane, 1938.
Artisans and Traders (Budge Budge)	85	29.41	25.88	38.82	5.88	—	—	—	Macfarlane, 1938.
Depressed Class	75	29.33	22.67	42.67	5.33	—	—	—	Macfarlane, 1938.
Bagdis	107	29.91	24.30	35.51	10.28	.1910	.2635	.5455	Macfarlane and Sarkar, 1941.
Muslims (Calcutta)	321	29.59	24.61	36.45	9.34	.1878	.2644	.5478	Greval and Chandra, 1940.
Brahmins (Calcutta)	201	37.81	19.90	35.32	6.97	.1448	.2403	.6149	Greval and Chandra, 1940.
Kayasthas (Calcutta)	149	35.57	19.46	40.27	4.70	.1301	.2603	.6096	Greval and Chandra, 1940.
Vaidyas (Calcutta)	50	64.00	16.00	18.00	2.00	—	—	—	Greval and Chandra, 1940.
Bramins, Kayasthas, Vaisyas (Calcutta)	504	32.74	21.63	36.11	9.52	.1698	.2619	.5683	Greval and Chandra, 1940.
Depressed Class (Calcutta)	160	38.75	23.75	30.62	6.87	.1672	.2095	.6233	Greval and Chandra, 1940.
Non. Bengali Hindus (Calcutta)	238	34.03	25.21	33.61	7.14	.1784	.2313	.5903	Greval and Chandra, 1940.
Anglo-Indians (Calcutta)	346	37.28	37.81	19.36	5.49	.2485	.1338	.6177	Greval and Chandra, 1940
Anglo Indians (Calcutta)	210	42.38	29.52	22.86	5.24	.1927	.1525	.6541	Macfarlane, 1942.
Parsees	100	43.00	33.00	18.00	6.00	.2188	.1280	.6532	Macfarlane, 1942.
East Bengal (Pakistan)									
Malda (Convicts)	45	31.11	26.67	31.11	11.11	—	—	—	Majumdar, 1949.
Barisal (Convicts)	136	31.62	22.06	37.50	8.82	.1688	.2675	.5637	Majumdar, 1949.
Mymensingh (Convicts)	112	30.36	23.21	37.50	8.93	.1766	.2687	.2547	Majumdar, 1949.
Rangpore (Convicts)	148	32.43	21.62	37.84	8.11	.1620	.2653	.5727	Majumdar, 1949.
Garos (Garo Hills)	142	26.76	22.53	40.84	9.86	.1784	.2989	.5227	Majumdar, 1950.
Sankha Banik (Dacca)	194	19.59	39.17	28.86	12.37	.3069	.2357	.4574	Majumdar, 1950—51.
Bengalis (Sampled in W. Pakistan)	122	39.34	27.05	27.87	5.74	.1809	.1859	.6332	Boyd 1954

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People	Total No.	O	A	B	AB	P	q	r	Author
West Bengal (India)									
Calcuta Bengalis	414	36.71	22.22	34.06	7.00	.1589	.2326	.6085	Buchi, 1953.
High—Castes	675	35.11	22.96	35.70	6.22	.1594	.2393	.6013	Sarkar et al, 1953.
Low Castes	312	31.09	20.83	39.74	8.33	.1588	.2800	.5672	Sarkar et al, 1953.
Muslims (Pargana Distt.)	128	28.12	21.87	41.41	8.59	.1671	.2945	.5384	Sen, 1954.
Brahmins (Pargana Distt.)	100	28.00	38.00	27.00	7.00	.2616	.1899	.5485	Sen, 1954.
Kayasthas (Pargana Distt.)	139	38.13	20.14	34.53	7.19	.1475	.2365	.6160	Sen, 1954.
Mahisyas Pargana Distt.)	277	34.30	22.74	35.74	7.22	.1636	.2455	.5909	Sen, 1954.
Bagdis (Pargana Distt.)	38	23.68	26.32	34.21	15.79	—	—	—	Sen, 1954.
Kaoras (Pargana Distt.)	78	26.92	25.64	34.46	8.97	—	—	—	Sen, 1954.
Pods (Pargana Distt.)	133	25.56	14.29	46.62	13.53	.1486	.3642	.4872	Sen, 1954.
Muslim Patients	1.209	30.93	26.39	33.25	9.43	.1991	.2431	.5578	Das-Gupta and Chaterjee, 1955.
Hindu Patients	6.247	32.37	24.07	36.24	7.31	.1726	.2500	.5774	Das-Gupta and Chaterjee, 1955.
Rarhi Brahmins	372	36.02	24.46	30.38	9.14	.1655	.2297	.6048	Bhattacharjee 1956.
Muslims of West Bengal	354	33.33	23.73	33.90	9.04	.1663	.2552	.5785	Bhattacharjee 1956.
Brahmins	237	34.18	21.10	35.44	9.28	.1651	.2557	.5792	Majumdar, 1952.
Muslims	520	33.46	26.92	30.38	9.23	.2008	.2227	.5765	Majumdar, 1952.
Kayasthas	364	32.42	26.10	33.24	8.24	.1903	.2357	.5740	Majumdar, 1952.
Baidyas	95	33.68	24.42	27.37	10.53	—	—	—	Majumdar, 1952.
Rishis	72	23.61	25.00	40.28	11.11	—	—	—	Majumdar, 1952.
Banik Khattris and Mahisyas	52	28.85	25.00	28.85	17.31	—	—	—	Majumdar, 1952.
Artisans (Misc.)	139	35.97	20.14	33.81	10.07	.1434	.2490	.5876	Majumdar, 1952.
Marak Sangma (Garo)	71	26.76	23.94	28.03	11.27	—	—	—	Majumdar, 1952.
Nama Sudra	383	35.25	22.45	31.85	10.44	.1795	.2386	.5819	Majumdar, 1952.
Brahmins	188	38.30	22.34	32.98	6.38	.1560	.2218	.6223	Sen, 1960.
Kayasthas	269	37.17	27.13	29.37	6.32	.1850	.1989	.6161	Sen, 1960.
Vaidyas	88	31.82	31.82	25.00	11.36	.2451	.2013	.5535	Sen, 1960.
Miscellaneous	57	19.13	28.06	42.11	10.52	.2200	.3172	.4637	Sen, 1960.
CENTRAL ZONE									
Bihar									
Low Caste (Santhal Pargana)	—	47.14	14.05	33.88	4.96	—	—	—	Sarkar.
+Santhals (Santhal Pargana)	339	33.03	20.94	34.81	11.29	.160	.249	.574	Sarkar, 1936—37.
+Male Hill (Santhal Pargana)	235	42.12	25.53	26.81	5.53	.173	.181	.649	Sarkar, 1936—37.
Male Plains (Santhal Pargana)	—	29.41	8.82	50.0	11.76	—	—	—	Sarkar.
Birhors (Palamau)	39	20.51	17.95	51.28	10.26	—	—	—	Sarkar, 1949.
Cheros (Palamau)	35	34.28	34.28	22.86	8.57	—	—	—	Sarkar, 1949.
Korwas (Palamau)	114	19.30	27.19	32.46	21.05	.233	.280	.439	Sarkar, 1949.
Asuras (Palamau)	21	38.10	57.14	—	4.76	—	—	—	Sarkar, 1949.
Bhuiyas (Palamau)	35	25.71	34.29	25.71	14.29	—	—	—	Sarkar, 1949.
Kisans (Palamau)	30	36.67	13.33	43.33	6.67	—	—	—	Sarkar, 1949.
Kharwars	53	16.98	20.75	41.51	20.75	—	—	—	Sarkar, 1949.
Birjias (Palamau)	129	10.85	17.05	61.24	10.85	.1545	.4831	.3634	Sarkar, 1954.
Karwas (Palamau)	147	31.7	35.6	20.4	12.3	.2734	.1775	.5491	Majumdar, 1943.
Hos (Kolhan)	186	34.95	31.72	27.96	5.38	.2087	.1852	.6061	Majumdar, 1950—51.
Birhors	102	31.37	35.29	23.53	9.80	.2588	.1833	.5579	Majumdar, 1950—51.
Mundas (Singhbum Distt.)	120	33.33	30.00	29.17	7.50	.2103	.2051	.5846	Macfarlane, 1941.
Orissa									
Aboriginal Tribes	103	36.89	21.36	31.03	10.68	.1739	.2345	.5916	Sarkar, 1956.
Juang	115	21.74	21.74	47.83	8.69	.1682	.3452	.4866	Sarkar, 1956.
Sabara	86	22.09	24.42	38.37	15.12	—	—	—	Sarkar, 1956.
Korku	140	20.00	28.57	37.86	13.57	.2405	.3047	.4548	Macfarlane, 1941.
Orya Khandaits	60	45.00	18.33	25.00	11.67	—	—	—	Macfarlane, 1941.
Chhota Nagpur									
Oraons, Mundas, Santhals mixed.	589	24.30	27.50	36.80	11.40	.218	.280	.493	Malone and Lahiri, 1928—29.
Oraons (Several Sources)	155	47.10	12.90	34.84	5.16	.088	.219	.687	Sarkar, 1942—43
Oraons (Palamau)	115	26.09	27.83	33.91	12.17	.233	.274	.501	Sarkar, 1949.
Oraons	125	25.6	28.8	38.4	7.2	.20	.27	.53	Kirk et al, 1962.

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People	Total No.	0	A	B	AB	P	q	r	Author
Oraons (Andaman Islands)	100	19.00	25.00	38.00	18.00	.24	.33	.42	Lehman and Ikin (c/t, Mourant et al 1958).
Madhya Pradesh									
Hindu Soldiers (C.P. and Berar)	118	27.97	21.19	38.14	12.71	.1855	.2967	.5178	House nad Mahalanobis, 1939—45.
Balahis (Nimar Distt. Khandwa)	200	30.50	32.00	30.00	7.50	.2240	.2111	.5649	Macfarlane, 1941.
Madhyandin Brahmins	282	43.97	25.89	24.82	5.32	.1708	.1644	.6648	Karve and Dandekar, 1951.
Marias (Dentemara Tehsil)	50	26.00	28.00	36.00	10.00	—	—	—	Sarkar.
Marias (Jagdalpur)	50	26.00	30.00	38.00	6.00	—	—	—	Sarkar.
Maria Gonds of Jagdalpur (Bastar)	123	28.45	26.02	34.15	11.38	.2084	.2614	.5302	Macfarlane, 1940.
Bhils									
Nimar Bhils (M.P.)	140	18.57	23.57	41.43	16.43	.218	.344	.431	Macfarlane, 1941.
Bhils of Madhya Bharat (M.P.)	534	34.64	28.09	28.09	9.18	.2075	.2075	.5850	Bose, 1952.
Rajpipla Bhils	156	38.46	24.36	28.85	8.33	.217	.200	.620	Majumdar, 1950—51.
Panchmahal Bhils	369	37.40	27.64	26.02	8.94	.195	.185	.611	Majumdar, 1950—51.
Khandesh Bhils	150	40.0	28.67	24.00	7.33	.196	.168	.633	Majumdar, 1950—51.
WESTERN ZONE									
Gujarat									
Ahmadabad (Bhillimora)	100	33.00	23.00	35.00	9.00	.1753	.2515	.5732	Majumdar and Krishen, 1948—49.
Bhangi (Porbandar, Jam Nagar)	126	23.81	28.57	30.16	17.46	.2615	.2722	.4663	Majumdar and Krishen, 1948—49.
Bhatia (Kutch, Nawanagar, Porbandar, Bombay)	106	30.19	29.24	27.36	13.21	.2390	.2268	.5342	Majumdar and Krishen, 1948—49.
Audich Brahmin (Kutch, Nawanagar, Porbandar, Bombay and Dwarka)	106	33.96	22.64	29.25	14.15	.2013	.2433	.5554	Majumdar and Krishen, 1948—49.
Nagar Brahmin (Kutch, Rajkot, Jam Nagar, Bombay)	107	33.64	32.71	26.17	7.48	.2275	.1861	.5864	Majumdar and Krishen, 1948—49.
Bhils (Western Khandesh)	200	40.00	29.00	24.00	7.00	.1998	.1691	.6311	Majumdar and Krishen, 1948—49.
Kharva (Porbandar)	106	37.74	22.64	28.30	11.32	.1851	.2203	.5946	Majumdar and Krishen, 1948—49.
Khoja (Kutch, Porbandar, Jam Nagar, Bombay)	120	30.00	23.33	35.00	11.67	.1927	.2682	.5391	Majumdar and Krishen, 1948—49.
Koli (Kutch, Ahmadabad)	100	32.00	21.00	36.00	11.00	.1743	.2702	.5555	Majumdar and Krishen, 1948—49.
+Kunbi Pattidar (Rajpipla Billimora, Nawanagar, Kutch Ahmadabad)	134	29.85	25.37	32.84	11.94	.2070	.2554	.5376	Majumdar and Krishen, 1948—49.
Luhana (Porbandar, Jam Nagar, Kutch)	147	28.57	20.41	41.50	9.52	.1631	.3005	.5364	Majumdar and Krishen, 1948—49.
Machhi (Rajpipla)	108	27.78	33.33	22.22	16.67	.2873	.2141	.4986	Majumdar and Krishen, 1948—49.
Memon (Kutch, Porbandar, Jam Nagar, Bombay)	100	25.00	24.00	40.00	11.00	.1944	.3009	.5047	Majumdar and Krishen, 1948—49.
Mher (Porbandar)	104	30.77	36.54	26.92	5.77	.2435	.1819	.5746	Majumdar and Krishen, 1948—49.
Kiana (Kutch, Dwarka, Mithapur)	100	24.00	26.00	40.00	10.00	.2017	.2954	.5029	Majumdar and Krishen, 1948—49.
Parsee (Billimora, Bombay)	231	30.30	23.38	36.36	9.96	.1834	.2671	.5495	Majumdar and Krishen, 1948—49.
Rabari (Porbandar, Jam Nagar, Kutch)	134	32.84	26.12	29.10	11.94	.2111	.2300	.5589	Majumdar and Krishen, 1948—49.
Satwara (Ahmadabad, Billimora, Porbandar, Dwarka, Mithapur)	100	25.00	25.00	38.00	12.00	.2064	.2930	.5005	Majumdar and Krishen, 1948—49.
Sunni Bohra (Rajpipla, Ahmad, Kutch, Bombay)	132	34.09	20.45	40.91	4.55	.1354	.2642	.6004	Majumdar and Krishen, 1948—49.

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People	Total No.	O	A	B	AB	P	q	r	Author
Waghar (Porbandar, Dwarka, Mithapur)	120	38.33	21.67	33.33	6.67	.1537	.2256	.2607	Majumdar and Krishen, 1948—49.
Ahmadabad (Blood Bank)	2.668	32.61	21.70	36.39	9.30	.1690	.2626	.5682	Desai, 1955.
Kapol Vania	200	39.5	38.0	14.5	8.0	.2556	.1082	.6362	Vyas et al, 1958.
Bhangi Harijans of Saurasthra	200	24.5	29.0	37.5	9.0	.2306	.2859	.4835	Vyas et al, 1958.
Cutchi Lohana	200	31.0	24.0	40.0	5.0	.1798	.2783	.5415	Vyas et al, 1958.
Audichya Brahmins of Shihor Sampradaya	200	37.0	32.5	22.5	8.0	.2261	.1637	.6102	Vyas et al, 1958.
Leva Patidars of Charotra	200	35.0	21.5	37.5	6.0	.1584	.2570	.5850	Vyas et al, 1958.
Talavia Dubla	212	33.06	22.2	36.3	8.5	.1684	.2577	.5741	Vyas et al, 1958.
Dubla	212	33.4	22.2	35.9	8.5	.1673	.2540	.5787	Vyas et al, 1962.
Koli	176	45.5	17.0	30.1	7.4	.1180	.1980	.6840	Vyas et al, 1962.
Naika	171	33.3	29.2	31.0	6.4	.2104	.2212	.5684	Vyas et al, 1962.
Dhodia	201	37.8	38.3	16.4	7.5	.2592	.1222	.6186	Vyas et al, 1962.
Gamil	203	34.5	37.9	16.3	11.3	.2702	.1282	.6016	Vyas et al, 1962.
Bhil	158	29.1	25.9	32.9	12.0	.2044	.2505	.5451	Vyas et al, 1962.
Dhanka	205	32.2	26.8	34.6	6.3	.1972	.2456	.5572	Vyas et al, 1962.
Maharashtra									
+Bombay Hindus (Blood Bank Data)	946	39.4	23.8	29.7	7.1	—	—	—	Sanghvi, 1944 (c/f, Sanghvi, 1954)
	974	35.1	26.3	29.6	9.0	—	—	—	Sanghvi, 1944 (c/f, Sanghvi, 1954)
	1.074	37.1	27.2	27.3	8.4	—	—	—	Sanghvi, 1944 (c/f, Sanghvi, 1954)
	491	42.0	22.0	26.7	9.3	—	—	—	Sanghvi, 1944 (c/f, Sanghvi, 1954)
Total:	3.485	38.4	24.8	28.3	8.5	.1826	.2042	.6132	Sanghvi, 1944 (c/f, Sanghvi, 1954)
+V.N.B.	200	41.0	30.0	24.5	4.5	.1918	.1583	.6498	Sanghvi and Khanolkar, 1949.
+Desasth Brahmin (D.R.B. & D.Y.	200	37.5	25.0	30.0	7.5	.1784	.2094	.6122	Sanghvi and Khanolkar, 1949.
+Koknasth BrahminB.) (K.B.)	200	51.0	24.0	20.0	5.0	.1570	.1335	.7095	Sanghvi and Khanolkar, 1949.
+Chandrasenia Kaysth Prabhu (C.K.P.)	200	34.5	28.5	28.5	8.5	.2063	.2063	.5874	Sanghvi and Khanolkar, 1949.
+Maratha (M.K.)	200	35.5	31.0	25.5	8.0	.2190	.1846	.5964	Sanghvi and Khanolkar, 1949.
+Christians (Bombay)	200	39.5	32.5	22.5	5.5	.2134	.1521	.6345	Sanghvi, 1954.
+Parsees (Bombay)	200	41.0	22.0	28.5	8.5	.1652	.2050	.6298	Sanghvi, 1954.
+Marathas:									
Ratnagiri	288	30.2	34.7	26.8	8.3	—	—	—	Sanghvi, 1954.
Desh	226	30.1	31.4	27.9	10.6	—	—	—	Sanghvi, 1954.
Colaba	166	34.9	32.5	22.3	10.3	—	—	—	Sanghvi, 1954.
Other Regions	178	36.5	27.5	23.6	12.4	—	—	—	Sanghvi, 1954.
Total:	858	32.4	31.9	25.5	10.2	.2382	.1975	.5643	Sanghvi, 1954.
K) **Konkan:**									
Maratha-1	88	47.73	32.95	14.77	4.55	—	—	—	Karve, 1948.
Maratha-2	55	45.45	30.91	20.00	3.64	—	—	—	Karve, 1948.
Maratha-3	55	41.81	23.64	21.82	12.73	—	—	—	Karve, 1948.
Total Maratha Group-A	198	45.45	29.80	18.18	6.57	.2023	.1325	.6742	Karve, 1948.
B) **Manal:**									
Maratha-4	33	30.30	21.21	45.46	3.03	—	—	—	Karve, 1948.
Maratha-5	38	44.74	23.68	26.32	5.26	—	—	—	Karve, 1948.
Maratha-6	45	28.90	33.33	33.33	4.44	—	—	—	Karve, 1948.
Total Maratha Group-B	116	34.47	26.75	34.47	4.31	.1967	.2176	.5872	Karve, 1948.
C-I) **Deccan Plateau**									
Maratha-7	85	56.47	20.00	18.82	4.71	—	—	—	Karve, 1948.
Maratha-8	46	36.96	30.44	28.26	4.34	—	—	—	Karve, 1948.
Maratha-9	63	42.86	39.68	12.70	4.76	—	—	—	Karve, 1948.
Total Maratha Group-C-I	194	47.42	28.87	19.07	4.64	.1846	.1266	.6888	Karve, 1948.
C-2)									
Maratha-10	53	45.28	20.75	26.42	7.55	—	—	—	Karve, 1948.
Maratha-11	64	32.82	26.56	26.56	14.06	—	—	—	Karve, 1948.
Maratha-12	45	46.67	22.22	28.89	2.22	—	—	—	Karve, 1948.
Maratha-13	133	42.11	30.83	21.05	6.01	—	—	—	Karve, 1948.
Maratha-14	88	26.14	36.36	28.41	9.09	—	—	—	Karve, 1948.

...Contd.

People	Total No.	O	A	B	AB	P	q	r	Author
Maratha-15	129	48.84	32.56	15.50	3.10	—	—	—	Karve, 1948.
Maratha-16	60	53.34	18.33	23.33	5.00	—	—	—	Karve, 1948.
Total Maratha Group-C-2	572	41.95	28.68	22.90	6.47	.1947	.1594	.6477	Karve, 1948.
D) Maratha-17	41	26.83	19.51	34.15	19.51	—	—	—	Karve, 1948.
Maratha-18	29	34.48	17.24	44.83	3.45	—	—	—	Karve, 1948.
Maratha-19	15	26.67	40.00	26.67	6.67	—	—	—	Karve, 1948.
Total Maratha Group D	85	29.41	22 35	36.47	11.77	.1884	.2806	.5423	Sanghvi et al, 1954.
Marathas	201	26.9	26.3	24.4	12.4	.283	.204	.513	Sanghvi, 1954.
Mahars	409	31.8	25.2	34.7	8.3	—	—	—	Das et al, 1961.
Mahars (Nagpur)	268	38.06	20.89	30.97	10.08	.1676	.2301	.6022	Karve and Dandekar, 1951.
+Mahar	102	23.53	25.49	36.27	14.71	.215	.288	.485	Karve and Dandekar, 1951.
Brahmin Desasth Rigvedi	154	37.01	24.68	31.17	7.14	.1745	.2149	.6106	Karve and Dandekar, 1951.
Fulmali	95	27.37	28.42	34.74	9.47	—	—	—	Karve and Dandekar, 1951.
Koli	53	32.08	16.98	35.85	15.09	—	—	—	
Goa									
Marathas (Goa)	400	29.25	26.75	34.00	10.00	.2050	.2520	.5430	Correia, 1936.
Hindus (Goa)	200	33.50	24.5	31.00	11.00	.1955	.2367	.5678	P. de-Figueriedo, 1935.
Indian Christians (Goa)	309	31.07	22.65	30.42	15.86	.2115	.2617	.5268	P. de-Figueriedo, 1935.
Goan Students (Sampled in Uganda, Kampala)	50	34.00	34.00	30.00	2.00	—	—	—	Rife, D. C. 1956.
SOUTHERN ZONE									
Hyderabad									
Aurangabad Distt.	22	18.18	22.73	54.54	4.54	—	—	—	Macfarlane, 1940.
Southern Half of Hyderabad State	50	34.00	18.00	42.00	6.00	—	—	—	Macfarlane, 1940.
Total Hyderabad State	75	32.00	18.67	44.00	5.33	—	—	—	Macfarlane, 1940.
Adi Hindus (Untouchables)	75	32.00	18.67	44.00	5.33	—	—	—	Macfarlane, 1940.
Banjaras of Hyderabad State	43	39.50	21.00	34.90	4.60	—	—	—	Macfarlane, 1940.
Chenchus	25	68.00	12.00	12.00	8.00	—	—	—	Macfarlane, 1940.
Chenchus of Amrabad	54	22.22	51.85	16.67	9.26	—	—	—	Macfarlane, 1940.
+All Chenchus (Distt. Mehbub Nagar and Amrabad)	100	37.00	37.00	18.00	8.00	.252	.133	.608	Macfarlane, 1940.
Bhils (Aurangabad Distt. and Amrabad Taluk)	44	31.82	13.64	52.27	2.27	—	—		Karve and Dandekar, 1951.
Andha (Nanded Distt. Parbhani)	55	29.09	32.73	32.73	5.45	—	—	—	
Madras									
Southern Indians (tested in Singapore)	389	31.88	26.73	34.45	6.94	.1870	.2362	.5768	Allen and Scott, 1947.
Christian Soldiers (Madras)	276	32.25	22.83	39.85	5.07	.1527	.2608	.5865	House and Mahalanobis, 1939—45.
Muslim Soldiers (Madras)	144	27.08	27.08	36.81	9.03	.2022	.2661	.5317	House and Mahalanobis, 1939—45.
Hindu Soldiers (Madras)	1.117	42.97	24.08	28.29	4.66	.1564	.1819	.6617	House and Mahalanobis, 1939—45.
Christians	95	41.05	23.16	31.58	4.21	—	—	—	Sheshadrinathan and Timothy, 1942.
Hindus	1.834	39.2	24.42	30.2	4.84	—	—	—	Sheshadrinathan and Timothy, 1942.
Muslims	141	31.21	28.37	38.30	2.13	.1702	.2334	.5964	Sheshadrinathan and Timothy, 1942.
Anglo-Indian	47	55.32	19.15	25.53	.00	—	—	—	Sheshadrinathan and Timothy, 1942.
Christians	158	37.97	18.35	37.34	6.33	.1323	.2497	.6180	Reddy, 1943.
Hindus	1.248	42.15	23.24	30.61	4.01	.1479	.1926	.6595	Reddy, 1943.
Muslims	256	50.78	22.66	23.83	2.73	.1368	.1436	.7196	Reddy, 1943.
Anglo-Indians	96	56.25	29.17	11.46	3.12	—	—	—	Reddy, 1943.
Anglo-Indians	56	53.57	30.36	12.50	3.57	—	—	—	Ayer and Mummurthi, 1953.
Anglo-Indians	153	43.14	23.53	21.57	11.76	.1921	.1802	.6277	Ayer and Mummurthi, 1953.
Adi-dravida	515	39.22	18.06	35.34	7.38	.1361	.2425	.6214	Ayer and Mummurthi, 1953.
Brahmins	55	40.00	30.91	27.27	1.82	—	—	—	Ayer and Mummurthi, 1953.
Chetty	342	47.37	16.99	29.82	5.85	.1209	.1971	.6820	Ayer and Mummurthi, 1953.
Mudaliar	284	34.51	22.89	36.27	6.34	.1596	.2438	.5966	Ayer and Mummurthi, 1953.
Naicker	610	44.43	23.11	27.54	4.92	.1599	.1785	.6696	Ayer and Mummurthi, 1953.
Naidu	458	38.43	20.52	34.93	6.11	.1438	.2327	.6235	Ayer and Mummurthi, 1953.
Nair	141	38.30	31.21	23.40	7.09	.2145	.1663	.6192	Ayer and Mummurthi, 1953.

...Contd.

People	Total No.	O	A	B	AB	P	q	r	Author
Pillai	182	32.97	19.23	41.76	6.04	.1364	.2793	.5843	Ayer and Mummurthi, 1953.
Kannada speakers	154	46.75	24.03	25.97	3.25	.1480	.1595	.6925	Ayer and Mummurthi, 1953.
Malyalam speakers	177	44.07	20.34	31.07	4.52	.1336	.1979	.6685	Ayer and Mummurthi, 1953.
+Tamil speakers	494	41.1	23.1	39.9	5.9	.160	.259	.641	Ayer and Mummurthi, 1953.
Telugu speakers	134	41.79	23.13	29.10	5.97	.1581	.1944	.6475	Ayer and Mummurthi, 1953.
Tamil mixed	1.740	43.10	24.00	29.40	3.50	.154	.181	.657	Naidu and Nathan, 1938.
Tamil Non Brahmins	50	42.00	28.00	24.00	6.00	—	—	—	Macfarlane, 1936.
Pre-dravidians	50	48.00	30.00	9.00	12.00	—	—	—	Macfarlane, 1936.
Todas (Nilgiri Hills)	200	29.50	19.50	38.00	13.00	.178	.300	.545	Pandit, 1934.
Todas (Nilgiri Hills)	89	19.1	19.1	44.9	16.8	—	—	—	Kirk et al, 1962.
Kurumbas (Nilgiri Hills)	52	55.8	19.2	23.1	1.19	—	—	—	Kirk et al, 1962.
Irulas (Nilgiri Hills)	72	40.3	19.4	31.9	8.3	—	—	—	Kirk et al, 1962.
Tamils	128	39.8	25.0	28.1	7.0	.176	.194	.630	Kirk et al, 1962.
Kerala									
Malabar									
Paniyan (Malabar)	250	20.00	62.40	7.60	7.00	.4713	.913	.4370	Aiyappan, 1936.
Nayadi (Malabar)	50	28.00	0.00	72.00	0.00	—	—	—	Aiyappan, 1939.
Adiyan (Malabar Wynad)	38	10.53	68.42	7.89	13.16	—	—	—	Sarkar, 1954.
Jene-Kuruma (Malabar Wynad)	17	47.06	47.06	5.88	0.00	—	—	—	Sarkar, 1954.
Vettu Kuruma (Malabar Wynad)	17	11.76	11.76	70.59	5.88	—	—	—	Sarkar, 1954.
Mullu Kuruma (Malabar Wynad)	80	63.75	10.00	25.00	1.25	—	—	—	Sarkar, 1954.
Paniyan (Malabar Wynad)	313	22.36	64.22	7.67	5.75	.4533	.697	.4770	Sarkar, 1954.
Cochin									
Izhavans (Ernakulum)	132	58.33	24.44	12.12	5.30	.1594	.0906	.7500	Macfarlane, 1936.
Syrian Christians (Ernakulum)	140	36.43	26.43	28.57	8.57	.1934	.2067	.5999	Macfarlane, 1936.
Pre-dravidian Tribes (Ernakulum)	50	52.00	26.00	12.00	10.00	—	—	—	Macfarlane, 1936.
Malyalis (Lower Caste)	260	48.10	29.2	16.10	6.50	.199	.120	.694	Macfarlane, 1936.
Nairs	121	38.80	35.50	22.40	3.30	.218	.138	.623	Macfarlane, 1936.
Iluvas	77	58.30	24.20	12.20	5.30	—	—	—	Macfarlane, 1936.
Travancore									
Kannikars (South Trav.)	211	51.18	18.49	29.86	0.47	.1008	.1670	.7322	Karuna Karan, 1939.
Muthuvan	89	19.10	42.70	31.46	6.74	—	—	—	Iyer, 1946.
Pulayans	280	44.28	24.28	31.07	0.36	.1340	.1746	.6914	Iyer, 1946.
Kannikars (South Trav.)	151	39.73	35.10	22.52	2.65	.2135	.1366	.6499	Uma-Bose, 1952.
Uralis (North Trav.)	107	45.79	24.30	25.23	4.67	.1576	.1631	.6793	Uma-Bose, 1952.
Ulladan (Central Trav.)	245	32.65	33.47	25.71	8.16	.2368	.1874	.5758	Roy, 1955.
Aryan (Central Trav.)	78	32.05	32.05	23.08	12.82	—	—	—	Roy, 1955.
Vethuvan	64	16.06	46.88	32.81	6.25	—	—	—	Roy, 1955.
Mamman	64	34.37	31.25	18.75	15.62	—	—	—	Roy, 1955.
Muthuvans (North-East Trav.)	140	15.71	38.57	30.71	15.00	.3221	.2660	.4119	Roy, 1955.
Malapantran (Central Trav.)	116	32.76	44.83	13.79	8.62	.3162	.1186	.5652	Buchi, 1955.
Pallar (Tinne Velley Distt.)	112	33.93	23.21	35.71	7.14	.1661	.2451	.5888	Buchi, 1955.
Maladive Islands									
Maladivians (Addu Atoll)	211	34.60	24.64	33.18	7.58	.1771	.2309	.5920	Kalra, 1947.
Ceylon									
Tamils (Born in Ceylon) (sampled in Malaya)	2.000	39.65	19.55	33.55	7.25	.1441	.2301	.6258	Greene, 1929.
Tamils (Colombo)	136	50.74	13.97	30.88	4.41	.964	.1952	.7084	Hill, 1937.
Sinhalese (Colombo)	712	47.05	26.26	24.72	1.97	.1541	.1451	.7008	Hill, 1937.
Moors (Colombo)	29	34.48	24.14	34.48	6.90	—	—	—	Hill, 1937.
Burghers (Colombo)	61	57.38	27.87	13.11	1.64	—	—	—	Hill, 1937.
Veddahs	5	60.00	—	40.00	—	—	—	—	Hill, 1937.
Tamils (Colombo)	561	45.99	18.36	29.41	6.24	.1312	.1970	.6718	Seneviratne, 1944.

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People	Total No.	0	A	B	AB	P	q	r	Author
Sinhalese (Colombo)	3.605	46.42	22.82	26.51	4.24	.1464	.1683	.6853	Seneviratne, 1944.
Moors (Colombo)	130	42.31	17.69	34.62	5.38	.1230	.2255	.6515	Seneviratne, 1944.
Burgheres (Colombo)	294	46.60	28.57	19.73	5.10	.1855	.1329	.6816	Seneviratne, 1944.
Tamil Students	147	44.22	21.77	27.89	6.12	.1505	.1874	.6612	Koch and Weeratunga, 1953.
Sinhalese Students	340	49.41	22.35	25.88	2.35	.1381	.1538	.7131	Koch and Weeratunga, 1953.
Veddas	9	44.44	0.00	55.56	0.00	—	—	—	Lehman et al, 1955.
Tamils	128	39.1	20.3	30.5	10.1	.164	.227	.608	Kirk et al, 1962.
Sinhalese	160	40.0	30.0	26.3	3.7	.188	.165	.647	Kirk et al, 1962.
Wanni									
Badal	43	53.5	16.3	23.3	6.9	—	—	—	Kirk et al, 1962.
Beravas	14	50.0	14.3	28.6	7.1	—	—	—	Kirk et al, 1962.
Padhu	42	50.0	26.2	19.0	4.8	—	—	—	Kirk et al, 1962.
All Wanni	99	51.5	20.2	22.2	6.1	—	—	—	Kirk et al, 1962.
Veddas	51	47.1	9.8	41.2	1.9	—	—	—	Kirk et al, 1962.
Andaman and Nicobar **Islands**									
Jarawa (Andaman Islands)	5	100.00	0.00	0.00	0.00	—	—	—	Gates, 1940.
Onge (Andaman Islands)	11	27.27	27.27	36.36	9.09	—	—	—	Gates, 1940.
Onge (Andaman Islands)	34	14.71	67.65	5.88	11.76	—	—	—	Sarkar, 1952.
Andamanese (Havelock and Neil Islands)	21	9.52	57.14	23.81	9.52	—	—	—	Sarkar, 1952.
Nicobarese (Car Nicobar and Chowra Islands)	136	80.05	9.68	10.29	0.00	.186	.528	.9286	Sarkar, 1952.

Note: 1. In poulations marked with asterics (*), the gene frequencies p, q and r have been calculated by the author.
2. The gene frequencies have not been recorded in the case of populations where the total number tested is less than 100.

DISTRIBUTION OF MNS BLOOD TYPES

(Studies conducted with four anti-sera namely anti-M, anti-N, anti-S and anti-s)

People	Total No.	Phenotype frequencies (Absolute numbers)									Chromosome frequencies				Author
		MMS	MSs	MMs	MNS	MNSs	MNs	MNS	NSs	NNs	mS	ms	nS	ns	
PANJAB															
Panjabi Brahmins	95	4	14	14	7	16	22	3	8	7	.1887	.3850	.1586	.2677	Bhalla, 1963.
Panjabi Khattris	108	4	13	15	6	20	28	2	11	9	.1690	.3773	.1458	.3079	Bhalla, 1963.
Panjabi Aroras	84	2	11	12	5	14	21	2	9	8	.1557	.3801	.1538	.3104	Bhalla, 1963.
Combined Panjabi Hindus	267	10	38	41	18	50	71	7	28	24	.1712	.3808	.1527	.2953	Bhalla, 1963.
CHHOTA NAGPUR															
Oraons	125	3	16	25	11	27	28	4	6	5	.157	.459	.183	.201	Kirk et al, 1962.
SOUTH INDIA															
Tamil	50	8	11	5	6	10	6	—	2	2	.38	.32	.13	.17	Kirk et al, 1962.
Todas	50	1	13	17	4	7	6	—	1	1	.21	.58	.07	.14	Kirk et al, 1962.
Kurumbas	52	12	15	8	2	8	6	—	1	—	.43	.39	.07	.11	Kirk et al, 1962.
Irulas	72	2	16	17	2	9	22	—	—	4	.17	.55	.03	.25	Kirk et al, 1962.

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People	Total No.	Phenotype frequencies (Absolute numbers)								Chromosome frequencies				Author
		MMS	MSs	MMs	MNS	MNSs	MNs	MNS	NSs	NNs	mS	ms	nS	ns	
CEYLON															
Sinhalese	72	3	8	13	5	14	17	—	4	8	.16	.42	.09	.33	Kirk et al, 1962.
Tamils	80	8	12	16	4	21	9	1	4	5	.25	.41	.12	.22	Kirk et al, 1962.
Wanni:															
Bedal	43	4	4	11	3	13	4	1	3	0					
Beravas	14	1	7	3	1	1	1	—	—	—					
Padhu	42	2	7	6	2	9	10	2	4	—					
All Wanni	99	7	18	20	6	23	15	3	7	—	.24	.44	.14	.18	Kirk et al, 1962.
Veddahs	39	—	2	2	3	11	9	1	3	8	.11	.29	.14	.46	Kirk et al, 1962.

	Total No.	(Studies conducted with three anti-sera namely anti-M, anti-N, and anti-S)										
		MMS	MMs	MNS	MNs	NNS	NNs	mS	ms	nS	ns	
PANJAB												
N. W.Pakistan	101	24	18	31	14	5	9	.2739	.3647	.0890	.2724	Chaudhury et al, 1952.
Peshawar	153	46	18	45	28	5	11	.32742	.32945	.06222	.28092	Boyd, 1954.
Other N.W.F.P.	75	18	8	21	15	7	6	.25091	.33576	.12726	.28607	Boyd, 1954.
Total Lahore	226	39	36	59	50	19	23	.18736	.38565	.11816	.30883	Boyd, 1954.
Panjabis alone	202	34	35	53	44	17	19	.16740	.41428	.11442	.30390	Boyd, 1954.
Sikhs	213	50	39	51	44	8	21	.242	.399	.060	.299	Bird et al, 1956.
BOMBAY												
Marathas	148	33	19	29	29	12	26	.224	.323	.069	.384	Sanghvi et al, 1954.
DACCA												
Total Dacca	260	48	40	67	59	24	22	.19040	.39037	.13012	.28909	Boyd, 1954.
Bengalis alone	230	44	35	62	47	21	21	.20256	.37788	.12825	.29132	Boyd, 1954.
SOUTH INDIA												
Kotas	59	17	27	10	4	1	—	.190	.674	.085	.051	Lehman and Cotbush, 1952.
Kurumbas	15	8	1	4	—	—	2	—	—	—	—	Lehman and Cotbush, 1952.
Badagas	57	11	9	13	21	—	3	.239	.410	.000	.351	Lehman and Cotbush, 1952.
Todas	82	29	17	20	11	4	1	.276	.474	.130	.120	Lehman and Cotbush, 1952.
Paniyan	61	22	13	8	16	—	2	.281	.486	.000	.233	Lehman and Cotbush, 1952.
Canares	21	3	5	6	2	3	2	—	—	—	—	Lehman and Cotbush, 1952.
Coorgi	16	2	1	4	5	2	2	—	—	—	—	Lehman and Cotbush, 1952.
Irulas	86	27	17	17	18	—	7	.301	.414	.000	.285	Lehman and Cotbush, 1952.
Chenchu	108	21	12	35	16	17	7	.218	.324	.213	.245	Simmon et al, 1953.

(Studies conducted with five anti-sera namely,

People	Total No.	CCDEE	CCDe	CCDee	CCddee	CcDEE	CcDEe	CcDee	CcddEe	Ccddee
N. W. Pakistan (Muslims)	101	—	—	46	—	1	10	33	—	1
	% age			45.54		0.99	9.90	32.67		0.99
Sikhs	213	—	—	97	—	—	30	59	—	1
	% age			45.5			14.1	27.7		0.5
Panjabi Brahmins	311	—	6	118	—	—	41	96	—	3
	% age		1.93	39.94			13.18	30.87		0.96
Panjabi Khattris	417		9	165	—	—	46	137	—	3
	% age		2.16	39.57			11.03	32.85		0.72
Panjabi Aroras	252	—	5	100	—	—	29	79	—	3
	% age		1.98	39.68			11.51	31.35		1.19
Total Panjabi Hindus	980	—	20	383	—	—	116	312	—	9
	% age		2.04	39.08			11.84	31.84		0.92
Nairs	84	—	—	33	—	—	8	32	—	—
Christians	59	—	—	23	—	—	4	22	—	1
Eravas	43	—	—	11	—	—	4	19	—	1
Others	4	—	—	2	—	—	1	1	—	—
Total	190	—	—	69	—	—	17	74	—	2
Malyalis	% age	—		36.32	—		8.94	38.95		1.05
Oraons	125	1	1	89	—	2	12	17	—	—
Ceylon										
Sinhalese	160	—	—	74	—	—	14	49	—	1
	% age			46.3			8.8	30.6		0.6
Tamils	128	—	—	59	—	—	28	35	—	—
	% age			46.1			21.9	27.3		
Ceylon Contd... Wanni										
Bedal	43	—	1	20	—	—	6	13	—	—
	% age	—	2.3	46.5	—	—	14.0	30.2	—	—
Beravas	14	—	—	2	—	—	6	4	—	—
	% age	—	—	14.3	—	—	42.9	28.6	—	—
Padhu	42	—	—	25	—	—	3	12	—	—
	% age	—	—	59.5	—	—	7.1	28.6	—	—
All Wanni	99	—	1	47	—	—	15	29	—	—
Ceylon Contd...										
Veddahs	51	—	—	28	—	—	4	18	—	—
	% age	—	—	54.9	—	—	7.8	35.3	—	—
South India										
Tamil	128	—	—	55	—	—	13	45	—	2
	% age	—	—	43.0	—	—	10.2	35.2	—	1.5
Todas	89	—	—	33	—	—	1	43	—	2
	% age	—	—	37.1	—	—	1.1	48.3	—	2.2
Kurumbas	52	1	1	22	—	2	17	6	—	—
	% age	1.9	1.9	42.3	—	3.8	32.7	11.5	—	—
Irulas	72	1	2	18	—	2	16	20	—	—
	% age	1.4	2.8	25.0	—	2.8	22.2	27.8	—	—

SUMMARY

A study of Blood Group distribution in the Indian Sub-continent demarkates distinctly the non-tribals or caste-groups from the tribal populations. The distinguishing feature lies not so much in the occurrence of gene types as in the extent of frequency variations observed from place to place. The frequencies fluctuate much more abruptly and markedly in the tribal groups than in the non tribals. This, in all likelihood, is due to the fact that, until recently, the tribal populations have remained much more localized, isolated and undisturbed by the foreign influence than their more

Rh—Hr BLOOD TYPES
anti-C, anti-c, anti-D,-anti-E, and anti-e)

ccDEE	ccDEe	ccDee	ccddee	CDE (R_z)	CDe (R_1)	Cde (R')	cDE (R_2)	cDe (Ro)	cde (r)	Author
—	5 4.95	—	5 4.95	.0063	.6669	.0050	.0778	—	.2440	Chaudhury et al, 1952
5 2.3	9 4.2	4 1.9	8 3.8	—	.654	.013	.118	.040	.176	Bird et al, 1956
3 0.96	17 5.47	6 1.93	21 6.75	.0142	.5920	.0176	.0984	.0328	.2450	Bhalla, 1963.
5 1.20	22 5.27	7 1.68	23 5.52	.0170	.6081	.0152	.0873	.0339	.2385	Bhalla, 1963.
2 0.79	12 4.76	6 2.38	16 6.35	.0155	.5981	.0233	.0837	.0411	.2383	Bhalla, 1963.
10 1.02	51 5.20	19 1.94	60 6.12	.0156	.5994	.0187	.0898	.0359	.2406	Bhalla, 1963.
— — — — —	3 3 4 — 10 5.26	2 — — — 2 1.05	6 6 4 — 16 8.42	—	.5906	.0173	.0710	.0183	.3028	Bird et al, 1962.
1	1	1	—	.009	.849	—	.081	.061	—	Kirk et al, 1962.
1 0.6	10 6.3	3 1.9	8 5.0	—	.650	.013	.082	.038	.217	Kirk et al, 1962.
—	2 1.5	1 0.8	3 2.3	—	.707	—	.117	.024	.152	Kirk et al, 1962.
—	1	—	2							Kirk et al, 1962.
—	2.3	—	4.6							
—	1	—	1							Kirk et al, 1962.
—	7.1	—	7.1							
—	1	—	1							Kirk et al, 1962.
—	2.4	—	2.4							
—	3	—	4	.007	.689	—	.089	—	.214	Kirk et al, 1962.
—	—	1	—	—	.765	—	.039	.196	—	Kirk et al, 1962.
—	—	2.0	—	—						
—	1	1	11	—	.636	.026	.055	.012	.268	Kirk et al, 1962.
—	0.8	0.8	8.6							
—	—	1	9	—	.593	.036	.006	.019	.346	Kirk et al, 1962.
—	—	1.1	10.1							
1	2	—	—	.016	.651	—	.252	—	.081	Kirk et al, 1962.
1.9 3	3.8 5	—	5	.027	.487	—	.174	—	.312	Kirk et al, 1962.
4.2	6.9	—	6.9	—	—	—	—	—	—	

civilized neighbours. It is, therefore, not unexpected to find a lack of uniformity in the distribution of blood types in the tribal population of the Indian Sub-continent. On the other hand, the variations observed in the non tribal population, though significant enough to reveal certain ethnic affinities, are not so marked as in the tribals. It can be said that in spite of the proclaimed rigidities of the caste system in the Indian Sub-continent, variations of the same order are not come across. It appears that, although the caste system has played an important role in channelizing the gene frequencies to their present forms, the process has consistently been tempered by factors like migrations, foreign admix-

(Studies conducted with four anti-sera namely,

People	Total No.	CCDEE	CCDee	CCddee	CcDE	CcDee	Ccddee	ccDE	ccDee
Northern Zone									
Peshawar	155	4	62	—	16	38	2	12	6
	% age	2.58	40.00	—	10.32	24.52	1.29	7.74	3.87
Other N. W. F. P.	75	3	18	—	12	25	—	7	3
	% age	4.00	24.00	—	16.00	33.33	—	9.33	4.00
Total Lahore	227	4	88	—	28	67	2	15	11
	% age	1.76	38.77	—	12.33	29.52	.88	6.61	4.85
Panjabis alone	203	5	75	—	24	64	2	12	9
	% age	2.46	36.95	—	11.82	31.53	0.99	5.91	4.43
Eastern ZONE									
Total Dacca	266	6	131	2	30	65	4	13	5
	% age	2.26	49.25	0.75	11.28	24.44	1.50	4.89	1.88
Bengalis alone	230	6	118	2	24	58	3	12	4
	% age	2.54	50.00	0.85	10.17	24.58	1.27	5.08	1.69
Upper Castes of Bengal	171	—	85	—	20	49	2	6	4
	% age	—	49.71	—	11.70	28.65	1.17	3.51	2.34
Rarhi Brahmins of West	140	1	53	—	25	47	—	7	4
Bengal	% age	0.71	37.86	—	17.86	33.57	—	5.00	2.86
Muslims of West Bengal	221	7	108	—	34	60	—	5	3
	% age	3.17	48.87	—	15.38	27.15	—	2.26	1.36
Riang of Tripura	282	12	191	—	58	15	—	6	—
	% age	4.26	67.73	—	20.57	5.32	—	2.13	—
Western Zone									
Kapol Vania	200	1	57	—	31	67	1	18	8
	% age	0.50	28.50	—	15.50	38.50	0.50	9.00	4.00
Bhangi Harijan of	200	—	82	—	38	53	1	15	9
Saurasthra	% age	—	41.00	—	19.00	26.50	0.50	7.50	4.50
Cutchi Lohana	200	1	90	—	22	58	—	12	9
	% age	0.50	45.00	—	11.00	29.00	—	6.00	4.50
Audichya Brahmin of	200	—	60	—	19	82	—	12	8
Shihor Sampradaya	% age	—	30.00	—	9.50	41.00	—	6.00	4.00
Lewa Patidars of Charotar	200	—	68	—	15	86	1	4	9
	% age	—	34.00	—	7.50	43.00	0.50	2.00	4.50
Talavia Dubla	212	—	102	—	22	68	1	8	7
	% age	—	48.11	—	10.38	32.07	0.47	3.77	3.30
Koli	176	1	80	—	14	55	—	7	6
	% age	0.57	45.4	—	7.95	31.2	—	3.97	3.4
Naika	171	1	99	—	18	40	—	5	6
	% age	0.58	52.04	—	10.52	23.38	—	2.33	3.51
Dhodia	199	1	129	—	23	35	—	4	5
	% age	0.50	64.8	—	11.55	17.6	—	2.01	2.51
Gamil	203	—	130	—	17	45	1	6	4
	% age	—	64.03	—	8.37	22.11	0.49	2.96	1.97
Bhil	156	5	72	—	12	51	—	3	8
	% age	3.21	46.1	—	7.69	32.69	—	1.93	5.12
Dhanka	204	1	119	—	16	59	—	4	4
	% age	0.49	58.3	—	7.84	28.4	—	1.96	1.96
Marathas of Bombay	201	4	94	—	27	62	—	5	7
	% age	2.0	46.8	—	13.4	30.8	—	2.5	3.5
Southern Zone									
Kanikkar	109	4	52	—	15	28	—	6	—
	% age	3.67	47.71	—	13.76	25.69	—	5.50	—
Chenchus	108	—	—	—	—	—	—	—	—
Students in Madras	100	—	—	—	—	—	—	—	—
Others		—	—	—	—	—	—	—	—
Indian Muslims	156	—	—	—	—	—	—	—	—
Indian Students	105	—	—	—	—	—	—	—	—

OF Rh—Hr BLOOD TYPES
anti-C, anti-c, anti-D and anti-E)

ccddE	ccddee	CDE (R_z)	CDe (R_1)	Cde (R')	cDE (R_2)	cdE (R")	cDe (Ro)	cde (r)	Author
1	14	.0187	.5679	.0200	.0762	.0179	.0489	.2505	Boyd 1954.
0.65	9.03								
—	7	.03907	.4876	—	.1203	—	.0576	.2954	Boyd 1954.
—	9.33								
—	12	.0136	.5867	.0186	.0959	—	.0792	.2059	Boyd 1954.
—	5.29								
—	12	.0195	.5763	.0199	.6872	—	.0725	.2245	Boyd 1954.
—	5.91								
—	10	.0198	.6508	.0380	.0769	—	.0393	.1750	Boyd 1954.
—	3.76								
—	9	0.174	.6645	.0320	.0759	—	.0353	.1748	Boyd 1954.
—	3.81								
—	5	—	.6706	.0341	.0792	—	.0550	.1611	Sen 1960.
—	2.92								
—	3	.0060	.6368	—	.1198	—	.0821	.1553	Bhattacharjee 1956.
—	2.14								
—	4	.0227	.7104	—	.0874	—	.0439	.1356	Bhattacharjee 1956.
—	1.81								
—	—	.0255	.8239	—	.1198	—	.0308	—	Kumar and Sastry 1961.
—	—								
—	17	.0048	.5254	.0084	.1078	—	.0620	.2916	Vyas et al 1958.
—	8.50								
—	2	—	.6403	.0225	.1027	—	.1345	.1000	Vyas et al 1958.
—	1.00								
—	8	.0037	.6708	—	.0339	—	.0916	.2000	Vyas et al 1958.
—	4.00								
—	19	—	.5476	—	.0849	—	.0593	.3082	Vyas et al 1958.
—	9.50								
—	17	—	.5746	.0084	.0564	—	.0690	.2916	Vyas et al 1958.
—	8.50								
—	4	—	.6776	.0162	.0784	—	.0904	.1374	Vyas et al 1958.
—	1.89	—							
—	13	.0041	.6522	—	.0605	—	.0489	.2343	Vyas et al 1962.
—	7.3								
—	2	.0038	.7506	—	.0691	—	.0883	.0832	Vyas et al 1962.
—	1.17								
—	2	.0031	.7959	—	.0699	—	.0612	.0699	Vyas et al 1962.
—	1.00								
—	—	—	.7260	.0695	.0584	—	.1461	—	Vyas et al 1962.
—	—								
2	3	.0230	.6725	—	.0132	.0370	.1215	.1328	Vyas et al 1962.
1.28	1.92								
—	1	.0032	.7688	—	.0497	—	.0986	.0797	Vyas et al 1962.
—	0.49								
—	2	.014	.684	—	.090	—	.112	.100	Sanghvi et al 1954.
—	1.0								
—	4	.0261	.6907	—	.0916	—	—	.1916	Buchi 1953.
—	3.67								
—	—	—	.692	.163	.073	—	—	.072	Simmon et al 1953.
—	—	.009	.567	—	.094	—	.049	.283	Venkatramiah and Krishna Rao 1953.
—	—	—	.562	.044	.060	—	.034	.266	Wiener et al 1945.
—	—	—	.5664	.0385	.1048	—	.0427	.2477	Prasad et al 1949.

tures, intercaste liaisons etc., that have been responsible in neutralizing the isolating effect of caste system through genetic reshuffles.

The salient features of Blood Group distribution in the Indian Sub-continent may be listed as below:

1. There is a high frequency of Blood Group A in the Cis-Himalayan Mongoloid populations occupying the hills and valleys stretching from Nepal to N. E. F. A. More to the north, the Tibetans are characterised by an exceedingly high frequency of Group O.

2. There are also to be found certain pockets of high frequency of A in the Cis-Himalayan regions of U. P., Punjab, and Himachal Pradesh. The occurrence is, however, more patchy than in the eastern regions.

3. More to the South, in the plains of North West Pakistan, Punjab, U. P., and Bengal, there is a consistently higher frequency of the B than A.

4. The Blood Group distribution in the Central zone, which is mainly an area of the tribal populations, presents a disjointed picture. There is a good deal of variation from place to place with respect to the incidence of A and B.

5. A similar variation is also noticed in the frequency of A and B in the tribes and castes of Gujarat and Maharashtra. Both the Blood types show a range of variation between 20 per cent and 40 per cent. There is not much of a uniform distribution with respect to one or the other type, but instead, there is an alternatively higher incidence of A or B as we move from one population to another. The intercaste differences appear to be more pronounced in the western zone than in the northern parts of the Sub-continent.

6. The Southern peninsula is characterized once again by a higher frequency of B in the non-tribal population. The tribal groups, as in other areas, exhibit a good deal of variation in the frequencies of A, B and O. Most often it is A that exceeds B, occasionally, however, B tends to be more frequent than A.

7. An exceedingly high frequency of O characterizes the Blood Group picture of Ceylon. It ranges mostly between 40 per cent and 55 per cent. A similar trend with a still higher incidence of O is also observed among the Nicobarese. The incidence of A and B here is much less. Whereas, the Blood Groups A and B occur with a frequency of 10 per cent each, the incidence of O is as high as 80 per cent.

8. The Blood Group studies pertaining to MNSs system reveal a high frequency of gene m (ranging from 50 per cent to 80 per cent) and a relatively much lower frequency of gene n (ranging between 20 per cent and 50 per cent). The incidence of m is highest in the tribes of Southern India, and is reduced to its minimum in the northern regions.

9. A few studies which also included an examination of the S and s antigenes show a relatively much higher incidence of s than S. The incidence of the latter is, however, greater than in any of the mongoloid population.

10. There are many interesting variations in Rh gene frequency distribution in the Sub-continent. Certain populations like Oraons and Veddahs show a complete absence of Rh negative individuals. The highest incidence of 12.3 per cent is come across among the Todas of Nilgiri Hills. By and large, the incidence of Rh negative is higher in the north than in the south. Besides, it also occurs more frequently in the higher castes than in the lower castes.

11. A noteworthy feature of Rh distribution is an extremely high incidence of chromosome R_1 (CDe) with a frequency ranging mostly between 55 per cent and 70 per cent.

12. The rare chromosomes, R_2 (cDE) and R_0 (cDe) occur rather consistently all over the Sub-continent, although their frequencies never exceed 0.1 per cent. The others like R (CDE) and R′ (Cde) make their appearance much less frequently and their incidence rarely exceeds 0.5 per cent.

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