SEASONAL VARIATION OF THE INCIDENCE OF MYOCARDIAL INFARCTION IN JOHANNESBURG

PRELIMINARY COMMUNICATION*

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It has been our impression for some time that episodes of myocardial infarction and coronary insufficiency have a higher incidence in winter than in summer. Consequently we inspected the statistical records of the Metropolitan Life Insurance Company of New York[1] and noted a considerably higher death rate from myocardial infarction in winter months (Fig. 1). The highest rate is consistently in January to March which, in the United States, are normally the coldest months of the year, July being the warmest.[2] Studies in the available literature favour a higher winter incidence.[3-12] Several of these studies, however, have concerned themselves with the incidence of myocardial infarction found at necropsy and, as the chances of dying of heart disease may well be higher in winter, such figures may not reflect the true incidence of the disease. For this reason, and because only one previous study has been conducted in the Southern Hemisphere,[8] we decided to investigate the seasonal incidence of myocardial infarction among patients seen by us in private practice in Johannesburg. We regard this investigation as a preliminary observation.

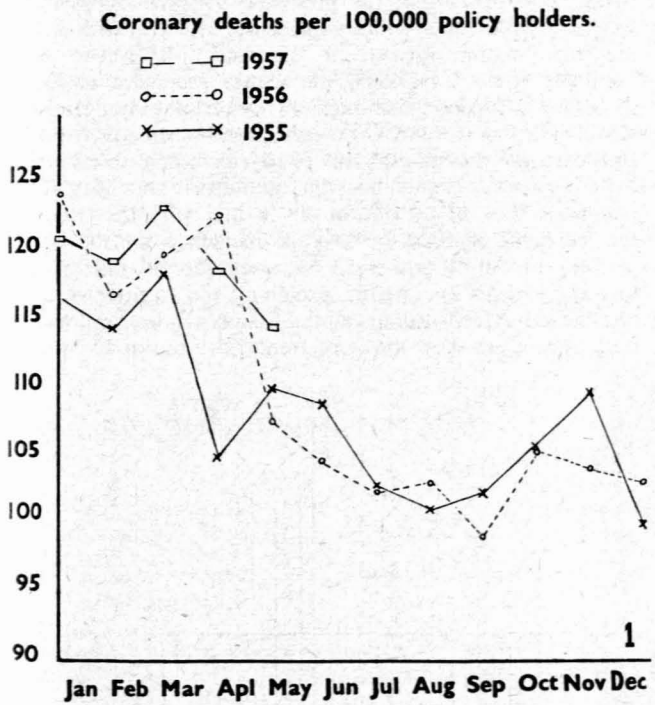

Fig. 1. Graph drawn from figures abstracted from Statistical Bulletin of Metropolitan Life Insurance Co.[1]

* A paper presented at the South African Medical Congress, Durban, September 1957. An article on similar investigations in Cape Town will be found at page 429 of this issue (see letter from Dr. Nellen, National Chairman, S.A. Cardiac Society, on page 436).

Methods

All the patients experiencing myocardial infarction between September 1953 and May 1957 inclusive have been studied. They fall into the following three groups:

1. Those with the classical clinical picture and electrocardiographic evidence of 'through and through' infarction.

2. Those with the classical clinical picture and other ancillary evidence of infarction, e.g. pyrexia, raised ESR or raised serum glutamic oxaloacetic transaminase (SGO-T), but with electrocardiograms not showing pathological Q waves. The electrocardiograms have shown ST-T changes of 'subendocardial' or 'subepicardial' infarction.[13]

3. Two patients with the classical clinical picture and markedly raised SGO-T, but with atypical electrocardiographic changes.

The number of episodes of myocardial infarction occurring each month was expressed as a percentage of the total number of all new patients seen by us in each month, thus allowing for the 'vagaries' of private practice, and for vacations on the part of patient and doctor.

The number of deaths occurring within the first fortnight of infarction was estimated.

Results

There were 228 episodes of myocardial infarction among a total 3,652 new patients, giving an incidence of 6·2%.

The monthly breakdown of these figures is shown in Table I and the monthly incidence is illustrated in Fig. 2.

TABLE I. MONTHLY INCIDENCE OF CASES OF MYOCARDIAL INFARCTION

Year	Month	M.I.	New Cases	M.I./New Cases (%)
1953	September	3	27	11·1
	October	0	45	0
	November	2	52	3·8
	December	1	8	
1954	January	5	58	8·6
	February	5	56	8·9
	March	3	77	4·0
	April	6	70	8·6
	May	3	48	6·3
	June	7	77	9·1
	July	3	65	4·6
	August	5	78	6·4
	September	2	48	4·2
	October	4	74	5·4
	November	1	87	1·1
	December	7	78	8·9
1955	January	1	68	1·5
	February	2	69	2·9
	March	6	87	6·9
	April	2	44	4·5
	May	6	99	6·2
	June	12	80	15·0
	July	7	64	10·9
	August	9	103	8·7
	September	9	82	11·0
	October	7	92	7·6
	November	4	107	3·7
	December	2	57	3·5
1956	January	3	80	3·8
	February	2	90	2·2
	March	4	109	3·7
	April	6	91	6·6
	May	4	76	5·3
	June	10	121	8·3
	July	6	99	6·0
	August	5	133	3·9
	September	5	112	4·5
	October	8	124	6·5
	November	10	111	9·0
	December	9	79	11·4
1957	January	6	131	4·6
	February	4	106	3·8
	March	8	119	6·7
	April	7	75	9·3
	May	7	96	7·3
	Total	228	3,652	6·2

M.I. = Myocardial Infarctions.

For the purposes of comparing 'summer' and 'winter' incidence, the period under review was divided into 4 com-

TABLE II. 'WINTER' AND 'SUMMER' INCIDENCE OF CASES OF MYOCARDIAL INFARCTION

		M.I.	New Cases	M.I./N.C. (%)
Summer Seasons	Oct. 53-Mar. 54	16	296	5·4
	Oct. 54-Mar. 55	21	463	4·5
	Oct. 55-Mar. 56	22	535	4·1
	Oct. 56-Mar. 57	45	670	6·7
	Total	104	1,964	5·3
Winter Seasons	Apr.-Sept. 54	26	386	6·7
	Apr.-Sep. 55	45	472	9·5
	Apr.-Sep. 56	36	632	5·7
	Total	107	1,490	7·18
Total		211	3,454	6·1

M.I. = Myocardial Infarctions.

pleted summer periods (October to March inclusive) and 3 completed winter periods (April to September inclusive). The distribution of the episodes in these periods is shown in Table II.

In the 'summer' periods there were 104 episodes amongst 1,964 new patients, giving an incidence of 5·3%. In the 'winter' periods there were 107 episodes amongst 1,490 new patients, an incidence of 7·18%. The application of standard tests suggests that the difference in incidence (1·88%) is 'significant at the 5% level'.

The 228 episodes were experienced by 211 patients, 13 patients had 2 attacks and 2 patients had 3 attacks during the period under review. There were 20 deaths within a fortnight of the attack—a mortality of 8·9%.

DISCUSSION

A major difficulty in assessing the seasonal incidence of myocardial infarction is the assessment of the 'population at risk'. This difficulty occurs both in hospital and private practice but perhaps to a greater degree in the latter. It was felt, however, that a calculation of the number of myocardial infarctions as a percentage of the total number of new patients seen each month would to some extent overcome the difficulty for the following reasons:

1. Allowance is made for (*a*) vacations by the doctor and patients and (*b*) increasing 'size' of practice.

2. There is no reason to suppose any alteration in the type of cases seen by specialist physicians in private practice.

A criticism of this method is that the actual 'population at risk' is progressively greater with the advance of time than is reflected by the number of new patients seen, as old patients to the practice are also at risk. However, by calculating the seasonal incidence of the whole period, this difficulty is probably overcome, since it will equally affect both 'summer' and 'winter' seasons.

Fig. 2 indicates that the presented seasonal difference is weighted by a high 'winter' incidence in 1955, with a low incidence in the subsequent 'summer'. However, even excluding these 2 periods, the winter incidence is found to be 0·4% higher. Although this is certainly not statistically significant, it follows the same trend. Moreover, if one considers *all* the months reviewed (including the 3 extra 'winter' months, September 1953 and April and May 1957) one finds that in 14 out of 21 'winter' months (66·6%) the incidence exceeds the average incidence for the whole period. In only 9 out of 23 'summer' months (39%) does this apply (Fig. 2). Again, excluding the 'winter' of 1955 and the subsequent 'summer', the figures are less impressive, but nevertheless show the same trend i.e. 9 out of 15 'winter'

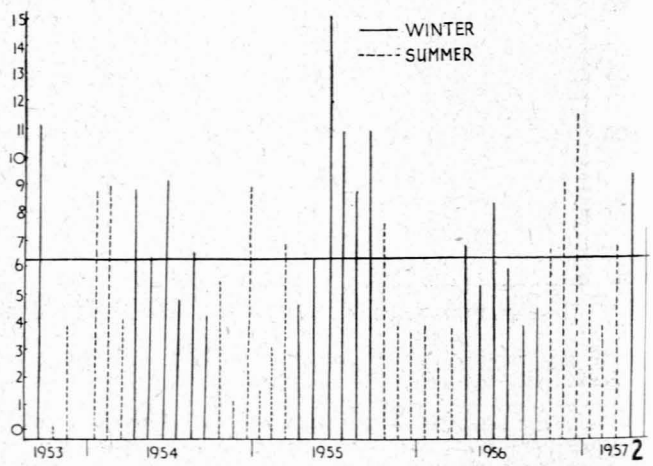

Fig. 2. Percentage incidence of cases of myocardial infarction in each month of period under review.

months (60%) exceed the average, compared with 8 out of 17 'summer' months (47%).

Over the whole period (i.e. including the extra 3 winter months) but excluding the 'winter' of 1955 and the subsequent 'summer', the 'winter' incidence of 6·5% exceeds the 'summer' incidence of 5·7%.

The greater winter incidence would be less impressive if the year was divided into a winter period from June to November and a summer period from December to May. However, we felt justified in dividing the year into 'winter' and 'summer' as stated, as difference between the winter and summer mean temperatures (maximum and minimum) is greater with this division than with the former.* It is of interest too that this method of dividing the year includes the months of greater average rainfall in the summer periods.

A survey of the available literature indicates that the great majority of authors found a higher winter incidence.[1,3-12] One group [14] found a higher summer incidence, but later [15] reported an increased frequency during periods of sudden inflow of both polar air and tropical air masses. Another group,[10] although believing that seasonal incidence was not important, stated: 'There is a slight tendency for more attacks to occur in the winter months.' Their statement that 'it is likely that the seasonal variation reported by others is to a large extent due to summer migration from the large communities on the part of susceptible persons' is not applicable to our series for the previously mentioned reasons. Miller *et al.*[16] and Master and Jaffe[17] noted no *striking* difference in the frequencies of myocardial infarction in any one season as compared with another. However, both groups showed a higher winter incidence in their published figures.

Master *et al.*[18] concluded that there was no significant seasonal variation, but Rosahn[9] analysed their figures by subdividing the year in a different way, and showed a highly significant difference with winter incidence predominant.

Lewitus and Neuman[19] found no significant difference between summer and winter incidence; in their series they showed that the incidence of myocardial infarction followed a Poisson distribution. The only previous study from the southern hemisphere[8] showed a higher winter incidence, but did not, in the figures presented, differentiate between myocardial infarction and left ventricular failure.

Thus, on the whole, there is good evidence for a higher winter incidence of myocardial infarction. However, in several series the figures concern *deaths* due to myocardial infarction, which might reflect a greater *severity* of heart disease in winter rather than a higher *incidence* of myocardial infarction. Our figures indicate an actual higher winter incidence and, if this can be substantiated by further analyses of much larger series, including hospital cases, there may be some justification for following the advice of Evan Bedford[3] to send 'potential cases to winter in warmer climates'.

* Calculated from figures supplied by the Parks and Recreation Department of the City of Johannesburg.

SUMMARY

The seasonal incidence of myocardial infarction in a series of private patients in Johannesburg is analysed. It is demonstrated that there is a higher winter incidence, and standard tests suggest that the difference is 'significant at the 5% level'.

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