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Motor Neuron Disease in Hong Kong Chinese: Epidemiology and Clinical Picture

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Abstract

This study documents the clinical features, incidence and prevalence of motor neuron disease (MND) in Hong Kong Chinese. Patients with MND who were alive between 1989 and 1992 were recruited by retrieval of medical records from the four major hospitals in Hong Kong, and by referral of neurologists, neurosurgeons and medical consultants. Mortality statistics was provided by the Census and Statistics Department. A total of 84 cases were identified with a male preponderance of 1.98:1. The average annual period incidence was 0.31/100,000 and the point prevalence on December 31, 1992, was 0.95/100,000. The mean age at onset was 55.5 years (range 19-81) with a peak observed from 55 to 65 years. The clinical features are similar to other reported series of MND. The incidence and mortality of MND in Hong Kong are therefore lower than the worldwide figures of 2.0/100,000 and 1.5/100,000, respectively.
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Introduction

Motor neuron disease (MND) is a degenerative disease affecting the anterior horn cells and pyramidal fibres. The epidemiology and clinical features are delineated in Caucasoid and Japanese but not in Chinese populations [1-7]. A study was published on the clinical picture and electromyographic findings of

MND in 198 patients in the Chiang Xu Province of the Republic of China, but the epidemiological aspects were not investigated [8]. Hong Kong is located to the south of Guangdong Province of China (latitude 22°20'N, longitude 114°12'E). Its population of 5.7 million is predominantly Chinese, and medical service is available at nominal cost to all citizens [9]. The present study was undertaken to

Table 1. Clinical classification of MND

MND	Men	Women	Total
<i>Clinically definite</i>			
Onset in the limbs (ALS/PBP)	20	10	30 (35.7)
Onset in the bulbar muscles (PBP/ALS)	17	11	28 (33.3)
<i>Clinically probable</i>			
PBP	0	1	1 (1.2)
Spinal ALS (3 regions) ¹	6	1	7 (8.3)
Spinal ALS (2 regions)	10	5	15 (17.8)
PMA	2	1	3 (3.6)
PLS	0	0	0 (0.0)
Total	55	29	84 (100)

ALS = Amyotrophic lateral sclerosis; PBP = progressive bulbar palsy; PMA = progressive muscular atrophy; PLS = primary lateral sclerosis.

Figures in parentheses represent percentages.

¹ Four of these patients presented with predominant respiratory failure with minimal limb weakness or wasting.

determine the clinical features, incidence and prevalence of MND among Hong Kong Chinese from 1989 to 1992.

Materials and Methods

We adopted the recommendations made by the World Federation of Neurology [10] in establishing the clinical diagnosis of MND. Patients were recruited into the study if they had progressive upper and lower motor neuron signs in at least two different regions of the central nervous system (cortical, brainstem, cervical, thoracic or lumbosacral spinal-cord motor neurons), and in the absence of sensory signs (including visual abnormalities), Parkinson's disease, and Alzheimer's disease. Recruited cases were further subclassified as in the Scottish Motor Neuron Disease Research Group [11]. Clinically definite MND was defined as upper and lower motor neuron signs involving the brainstem and one or more spinal regions (cervical, thoracic or lumbosacral). If signs were limited to the brainstem and only one spinal region, both upper and lower motor neuron signs were required in that region. Clinically probable MND included the following sub-categories: progressive bulbar palsy, spinal amyotroph-

ic lateral sclerosis, progressive muscular atrophy and primary lateral sclerosis (table 1). Appropriate tests such as CT or MRI of the neuroaxis, myelography, nerve conduction study and electromyography, blood tests for heavy metal screening, serum immuno-electrophoresis, and analysis of CSF were carried out in most cases to exclude diseases which could produce clinical syndromes mimicking MND. Patients with MND who were alive between January 1st, 1989, and December 31st, 1992, were identified by the following means: (1) medical records (ICD code 335.2) were retrieved from the four regional hospitals (Queen Mary Hospital, Queen Elizabeth Hospital, Kwong Wah Hospital, and Prince of Wales Hospital) which are tertiary referral centres for neurological diseases in the territory; (2) letters were sent to internists and geriatricians in the public sector apart from the four above hospitals and to all neurologists and neurosurgeons in Hong Kong, requesting them to complete a simple questionnaire concerning possible cases of MND formerly under their care, and (3) an announcement was made in the monthly newsletter of the Hong Kong Medical Association asking all doctors to report possible cases.

All available patients or their case notes were evaluated by the authors to ascertain the diagnosis and clinical picture. Their current status was also clarified via telephone, letters of enquiry or family visits.



Fig. 1. Age distribution of MND onset and deaths among Hong Kong Chinese (1989-1992).

The mortality and population statistics were provided by the Census and Statistics Department. Death certificates in which MND (ICD code 335.2) was entered as the direct or contributory cause of death during the period of 1989-1992 were analysed.

Results

Sixty-three patients were identified from the four regional hospitals, and a further 33 patients were referred from other hospitals and private practitioners. Fifty letters were sent, to which 35 (70%) responded; 19 doctors contributed data of 1 or more patients. Fourteen patients were identified by more than 1 source. However, the clinical details of 6 possible cases could not be obtained from the private clinic because of failure in retrieval of medical records. Six patients with possible MND were rejected either because of wrong diagnosis or a non-progressive history. Thus, a total of 84 cases met our diagnostic criteria and were enrolled in the study.

The Chinese population in Hong Kong, based on the census carried out in 1991, was 5.7 million. The numbers of new MND cases diagnosed in 1989-1992 were 17, 14, 17, and 22, respectively, hence the average annual incidence was 0.31/100,000. As 31 patients had succumbed by December 31st, 1992, the point prevalence was 0.95/100,000. Another twelve deaths occurred in the year 1993, and the calculated mean survival for all deaths from onset of symptoms was 2.8 years (range 0.5-6 years). The male to female ratio was 1.98:1, but the male preponderance was not apparent in those presenting at age 65 and above. The mean age at onset was 55 years (range 19-81) with a peak observed from 55 to 65; onset was before age 50 in 35% of the cases (fig. 1).

Of these 84 cases, 57 (68%) were clinically definite MND and the rest were clinically probable cases (table 1). For those with clinically definite MND, bulbar or limb onset was of similar frequency. The majority of patients

Table 2. Age- and sex-specific average annual incidence and mortality rates of MND/100,000 (1989–1992)

Age group years	Male			Female			Total		
	P	I	M	P	I	M	P	I	M
20–29	4.8	0.10	0.05	4.6	0.05	0.00	9.5	0.08	0.03
30–39	5.3	0.19	0.05	4.8	0.10	0.05	10.8	0.14	0.05
40–49	3.3	0.45	0.53	2.7	0.19	0.19	6.0	0.67	0.42
50–59	2.6	0.87	0.87	2.3	0.65	0.54	4.9	1.28	0.71
60–70+	3.3	0.61	1.10	3.8	0.86	1.18	7.1	1.13	1.58

P = Population/100,000; I = incidence; M = mortality.

reported muscle weakness as the initial symptom (83%), 45% noticed difficulty in speaking, 40% difficulty in walking, 20% muscle wasting, and 5% difficulty in breathing. Bulbar dysfunction was found in 29 patients at presentation (34.5%), and the rest of the physical findings were similar to that in other reported series. Of those 36 patients without initial bulbar involvement, 19 patients (53%) had MRI, or CT and myelograms of the cervical cord to exclude the possibility of myelopathy. Two of these patients were subjected to cervical decompression due to thecal compression by spondylotic tissues, but the procedure did not result in any clinical improvement. Most patients (96%) underwent electromyographic examination showing denervation changes to support the clinical diagnosis.

One patient with a positive family history was identified. He was a 19-year-old student who presented with progressive bulbar palsy, developed generalised involvement within 6 months and died of aspiration pneumonia 2 months afterwards. Autopsy showed a variable degree of neuronal loss and demyelination involving the corticospinal tracts at the lower medulla and cervical spinal cord. His mother had had a similar history of progres-

sive dysarthria and dysphagia for 1 year and had died at the age of 30; his two siblings were normal, however. The age of death based on death certificates during the same period when MND was entered as the direct or contributory cause (ICD code 335.2) are also shown in figure 1. The calculated average annual mortality of MND was 0.33/100,000 with a male to female ratio of 1.68:1. The age- and sex-specific incidence and mortality rates are presented in table 2. The age-specific incidence rate rises steadily with age, peaks at age 50–59 and slightly declines afterwards whereas the age-specific mortality rate peaks at age 60 and above.

Discussion

In this study we have shown a low incidence, prevalence and mortality of MND among Hong Kong Chinese. The 1% familial incidence is also low compared to the reported figures of 5–10% [12, 13]. Nevertheless, the clinical picture is similar to sporadic MND cases reported in the Chinese series [8] and other studies [2, 4, 14]. However, this low incidence and prevalence of MND in Hong Kong must be regarded as the minimum esti-

mate because of certain limitations in the study.

Whilst we attempted to identify cases from all available sources, our study was retrospective and based on retrieval of records from hospitals and clinics. Thus, incomplete case ascertainment due to underreporting is likely. A point of note is that the mortality data given by the death certificates is slightly higher than the incidence rate obtained from retrospective record analysis. Besides reflecting possible underreporting, this observation may also indicate false-positive diagnostic coding. Two studies have examined this issue and show that the cause of death in about 10–30% of patients was miscoded as MND [1, 15]. False-positive coding probably existed in the death certificates as evidenced by the finding of 6 patients reported as MND who did not satisfy our present stringent diagnostic criteria. In addition, the finding of a decline in incidence after age 75 would raise the possibility of underdiagnosis in the elderly population in whom MND may be missed clinically or confused with other neurodegenerative diseases. The magnitude of this error can only be determined by carrying out a systematic survey in the elderly population. Given such a low incidence of MND in the whole population, it would not be cost-effective to attempt such a screening procedure. In fact, age- and sex-specific rates in all incidence studies, except in that of Rochester, Minn., USA, show a steady rise to a peak, usually at 60–75 years, with a sharp decline after this [7]. Although our study is in keeping with this observation, future comparison of trends should take into account our methodological limitations.

With these provisos, we believe our data are reasonably correct for a number of reasons.

(1) A survey on medical consultations within 14 days showed that most subjects (93%) consulted doctors of conventional

Western medicine whereas only 7% consulted acupuncturists, bonesetters or herbalists [16]. Hence, we believe that most patients with MND would be diagnosed and treated under the care of competent physicians;

(2) As 80% of patients die within 5 years after the diagnosis of MND, the mortality figure should provide a fair estimate of the prevalence. As prevalence can be estimated by multiplying the mortality rate with the average disease duration, the projected prevalence based on mortality data supplied by the Census and Statistics Department was therefore 0.92/100,000, which matched reasonably well with our prevalence figure. In addition, the distribution of age at onset and age at death are well matched (fig. 1).

(3) MND is a progressive and fatal illness and most patients will be seen at least once by a neurologist before a definite diagnosis is entertained. This is supported by the fact that 14 patients were seen by 2 or more neurologists, and that all patients were seen by more than 1 physician.

(4) The annual incidence and mortality figures were fairly constant throughout these years.

(5) The possibility of incomplete retrieval of records was minimized by studying the disease incidence and prevalence in the past 4 years.

Table 3 shows a comparison of the incidence, prevalence, and mortality of the present study with other reported series. The worldwide incidence and prevalence of MND are in the order of 2/100,000 and 4/100,000, respectively, excluding those areas with especially high prevalence such as Guam and the Kii Peninsula of Japan [17]. Similarly, mortality figures of MND in most countries are above 0.4/million, and global figures range from 0.06 to 2.50/100,000 [22]. In contrast to this uniformity, the low incidence and mortality of MND in Hong Kong are comparable to

Table 3. Worldwide figures of MND epidemiology

Location	Author	Year(s)	I	P	M
Japan	Kondo and Ysubaki [1]	1977	0.9 [17]		0.4-0.6
Scotland	MND group [11]	1989	2.24		1.2-2.1 [7]
Rochester, Minn., USA	Juergens et al. [2]	1925-1984	2.0	6.0	0.9 [18]
Sweden	Forsgren et al. [19]	1969-1980	1.7	4.8	1.0-2.5
Guam	Lavine et al. [20]	1987-1988	100-200		30-650
Mexico	Olivaries et al. [21]	1972	0.4	0.8	0.28
Hong Kong	present study	1989-1992	0.31	0.92	0.33

I = Incidence/100,000; P = prevalence/100,000; M = mortality/100,000.

those studies conducted in India [23], Israel [24], Mexico [21], Africa and South American countries [25]. An interesting phenomenon was noted by Chancellor and Warlow [7] who showed that the age-standardised rates (45-74 years) of MND correlated positively with the degrees of latitude north. A low incidence of MND in Hong Kong is therefore in line with this observation. In addition, a recent study carried out in England showed that the mortality of MND among immigrants from Asia, Caribbean countries (West Indians) and Africa was much lower than that of Caucasoids [26]. These data provide further evidence that ethnic origin or environment may have an impact on the prevalence of the disease. Like others, we suggest that there is a

need to re-examine the commonly held premise of uniform distribution of MND in most parts of the world.

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