

The frequency of symptomatic sensory polyneuropathy in the elderly in an urban Malaysian community

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Abstract

Background: Neuropathic symptoms and signs are common in the elderly and are often considered normal findings. However, symptomatic polyneuropathy may contribute to disability and falls in the elderly. The prevalence of peripheral neuropathy in the elderly in Malaysia has not been previously reported. The objective of this pilot study is to determine the frequency of symptomatic sensory polyneuropathy in a group of elderly subjects in the community and their possible associated factors.

Methods: Cross sectional survey of subjects aged 65 years and above, carried out in an urban neighbourhood in Petaling Jaya. Using a standardised questionnaire, subjects were asked about sensory neuropathic symptoms, associated medical conditions and social habits. They were examined for the ankle reflex, vibration, joint position, and pinprick sensations. Possible symptomatic sensory polyneuropathy was defined as bilateral distal neuropathic symptoms, loss of pinprick sensation and proprioception sense. **Results:** Of the 100 subjects, 63% had neuropathic symptoms and signs and 20% had possible symptomatic sensory polyneuropathy. Subjects with polyneuropathy complained of more postural instability and giddiness and distal weakness. Diabetes mellitus was associated with the presence of neuropathic symptoms and signs but not with polyneuropathy. Age was significantly associated with polyneuropathy.

Conclusion: The frequency of symptomatic sensory polyneuropathy in a group of elderly subjects in an urban Malaysian community was 20%. The frequency increased with advancing age.

INTRODUCTION

Symptoms and signs of peripheral neuropathy are common in older persons and are sometimes considered part of the normal aging process.^{1,2} However, causes of peripheral neuropathy are also common in the elderly including diabetes mellitus, malignancy, nutritional deficiencies and chronic use of certain medications, e.g. anticonvulsants and chemotherapeutic agents.³ In addition, chronic idiopathic axonal polyneuropathy is a well-recognised entity in the elderly.⁴ Peripheral neuropathy in the elderly carries significant morbidity and may contribute to impaired balance and falls.⁵⁻⁸ This limits their physical function and results in the elderly being more home-bound or institutionalised, increasing the burden on the caregivers as well as the healthcare system.

The prevalence of peripheral neuropathy in the elderly in the community has not been widely studied. The few published reports in the general population have prevalence rates ranging from 2.4% to 8%, while a recent study in non-institutionalised elderly subjects reported

an overall rate of 31%.⁹⁻¹¹ The prevalence of peripheral neuropathy in the Malaysian elderly population is unknown.

This was a pilot study to determine the frequency of peripheral neurological symptoms and signs in a group of elderly subjects living in the community. In addition, we looked for factors that may be associated with the presence of these symptoms and signs in this group.

METHODS

The study was a cross sectional survey of subjects aged 65 and above in Section 17, an urban neighbourhood in the city of Petaling Jaya, Malaysia. The subjects were interviewed and assessed in various places including senior citizens' clubs, coffee shops, the market and taxi stations. Subjects who consented to participate were asked a series of questions using a standardised questionnaire which included demographic information (age, gender, race, occupation (if any)), diet and other habits (vegetarian, use of alcohol, smoking), associated

medical conditions (diabetes, hypertension, heart problems, renal problems, cancer), current medications (anticonvulsants, chemotherapy, lipid lowering drugs, antihypertensives, diabetic drugs) and other activities (physical exercise, e.g. sports, housework). They were asked about the presence of common sensory symptoms of peripheral neuropathy (distal numbness, tingling, neuropathic pain sensation (burning or electric like sensation) in the upper and lower limbs). Subjects were also asked about the presence of postural instability (trouble balancing), postural giddiness (giddiness on standing), limb claudication (pain in the lower limb(s) on walking) and distal weakness (weakness of the feet). Four clinical tests were carried out including vibration sensation (using a 125 Hz tuning fork at the medial malleolus and ulnar styloid), ankle reflexes bilaterally, joint position sense (of the interphalangeal joint of the big toe and thumb) and sensation to pinprick over the centre of the palm and sole. The latter was compared to pinprick sensation at the mid-sternal area as reference. Abnormality of the physical sign was defined as absence of vibration and joint position sensation, an absent reflex and reduced sensation in the test compared to the reference area over the sternum. To improve the quality of ascertainment, the investigators, who are medical students, underwent training by an experienced neurologist prior to the study on how to ask the questions and the significance of the each symptom and to standardize their clinical examination techniques.

The frequency of neuropathic symptoms and signs were recorded. As the presence of clinical signs of absent ankle jerks and loss of vibration sense may be considered normal in the older person, they were not used to indicate peripheral neuropathy.^{1,12-15} Possible symptomatic sensory polyneuropathy was defined as the presence of bilateral distal neuropathic symptoms (viz. numbness, tingling and neuropathic pain) and/or bilateral loss of pinprick sensation or joint position sense.

Data was analysed using the SPSS version 17. Possible factors associated with the presence of polyneuropathy were looked for and their significance tested using the chi-square or Mann-Whitney U test where appropriate.

RESULTS

There were 100 subjects aged 65 years and above, of which 52% were female. Reflecting the ethnic makeup of the urban Malaysian population, 68%

were Chinese, 23% Malay, 8% Indian, and 1% others. Median age was 69.5 years (range 65 to 89). The frequency of peripheral neuropathic symptoms and signs was 63%. The commonest symptom was limb tingling (paraesthesiae) (25%) followed by tingling and pain (3%), pain alone (3%) and loss of sensation (1%). The most common clinical signs were absent ankle reflexes (41%), loss of vibration sense (20%) while loss of joint position sense and reduced pinprick sensation were uncommon (1% each). Of the various subject characteristics, associated medical conditions, current medications, dietary/social habits and physical activities that may predispose to neuropathy; only diabetes mellitus and the use of diabetic medications was significantly associated with the presence of neuropathic symptoms and signs. (Table 1)

The frequency of subjects with possible symptomatic sensory polyneuropathy was 20%. The most common symptom was bilateral distal limb paraesthesiae. Patients with possible polyneuropathy had significantly more postural instability (45 versus 16.2%, $P=0.006$), postural giddiness (45 versus 21.2%, $P=0.03$) and distal foot weakness (35 versus 11.2%, $P=0.01$). There was no significant association with limb claudication.

Of the possible aetiological factors, only age (but not diabetes) was found to be significant. (Table 2) The frequency of symptomatic sensory polyneuropathy was 12% in the 65-69 age group, 19% in the 70-74 age group, 31.6% in the 75-79 age group, 40% in the above 80 age group. (Figure 1)

DISCUSSION

In subjects aged 65 years and above in the community we found a frequency of possible symptomatic sensory polyneuropathy of 20%. This compares with a prevalence of 31% previously reported in a study in non-institutionalised elderly but is much higher than the prevalence quoted for the general population of between 2.4 to 7%, suggesting a higher prevalence of polyneuropathy in the elderly.⁹⁻¹¹ In our subjects, symptomatic sensory polyneuropathy was significantly associated with complaints of postural instability and postural giddiness as well distal limb weakness. This suggests that symptomatic polyneuropathy in the elderly may not be entirely benign and have affect their mobility and balance and put them at risk of falls and injury.

Table 1: Factors associated with neuropathic symptoms and signs among the elderly

Factors		With neuropathic symptoms/signs	Without neuropathic symptoms/signs	p value	
Demographic factors	Age in years	52.8	46.4	0.302	
	Gender (%)	Male	42.9	56.8	0.179
		Female	57.1	43.2	
	Race (%)	Chinese	66.7	70.3	0.514
		Malay	23.1	21.6	
		Indian	9.5	5.4	
Others		0	2.7		
Diet	Vegetarian (%)	3.2	2.7	1.000	
	Alcoholism (%)	9.5	5.4	0.707	
	Diabetes (%)	42.9	16.2	0.006*	
Medical conditions	Renal problem (%)	3.2	0	0.529	
	Cancer (%)	3.2	2.7	1.000	
Medications	Chemotherapy (%)	3.2	2.7	1.000	
	Diabetic medication (%)	34.9	13.5	0.021*	
Lifestyle	Exercise regularly (%)	68.3	75.7	0.430	
	Housework regularly (%)	44.4	43.2	0.907	

* p<0.05

Table 2: Factors associated with possible symptomatic sensory polyneuropathy among the elderly

Risk Factors		With Neuropathy	Without Neuropathy	p value	
Demographic factors	Age (years)	61.9	47.7	0.049*	
	Gender	Male (%)	45	48.8	0.764
		Female (%)	55	51.2	
	Race	Chinese (%)	60	70	0.506
		Malay (%)	35	20	
		Indian (%)	5	8.8	
		Others (%)	0	1.2	
Diet	Vegetarian (%)	10	1.2	0.101	
	Alcoholism (%)	5	8.8	1	
	Diabetes (%)	45	30	0.202	
Medical conditions	Renal disease (%)	5	1.2	0.362	
	Cancer (%)	0	3.8	1	
Medications	Chemotherapy (%)	5	2.5	0.492	
	Diabetic medication (%)	30	26.2	0.735	
Lifestyle	Exercises regularly (%)	65	72.5	0.687	
	Housework regularly (%)	40	45	0.509	

* p<0.05

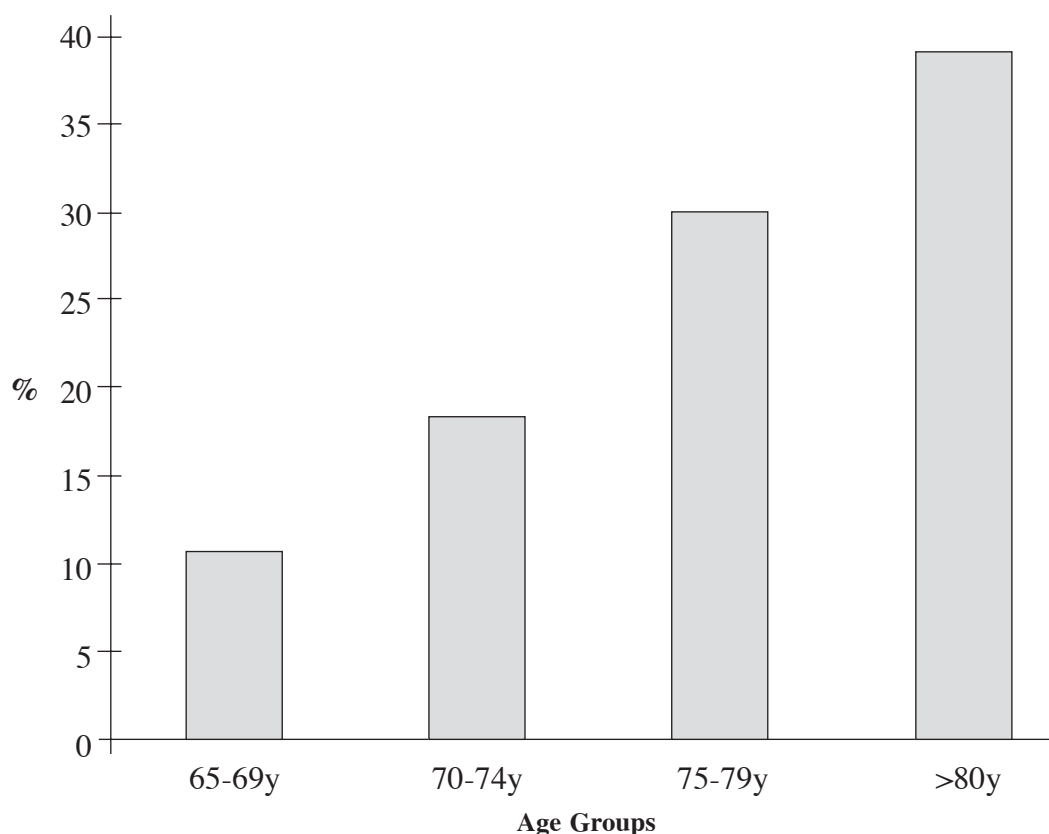


Figure 1. Frequency of possible symptomatic sensory polyneuropathy according to age group

We found a high frequency of neuropathic symptoms and signs in our subjects. The main abnormal signs were absent ankle reflexes (41%), as well as abnormal vibration sense (21%). These findings are not unusual in the elderly and are often considered to be normal.^{1,12-15} In a recent survey in a group of normal Malaysian subjects, the frequency of absent ankle jerks in older subjects (mean 58 years) was 25%.¹² The higher frequency in our study may be due in part to the fact that our subjects are older but may also be ascertainment bias due to weaknesses in the examination techniques of our medical students. As such we did not include the absence of ankle reflex or vibration sense as criteria for polyneuropathy.

There are several limitations in this study. Firstly, being a pilot study the sample size was small. Secondly, sampling was purposive and subjects were recruited only if they consented to take part and hence may be influenced by responder bias. Furthermore, our subjects were drawn from an urban middle-class neighbourhood and are certainly not representative of the entire

elderly population in Malaysia. Thirdly, the definition of polyneuropathy was subjective. However, we felt that the presence of bilateral distal neuropathic sensory symptoms and/or the presence of clearly defined and unambiguous signs such as loss of pain or joint position sense were sufficiently reliable for diagnosis. In fact, with our criteria, in which we did not include abnormal reflexes and vibration sense, an underestimation of the frequency of polyneuropathy may be more likely. It would have been ideal if the diagnosis was confirmed electrophysiologically but this was impractical in this survey. Although unlikely, in view of bilateral symptoms and signs, some subjects may have other conditions, e.g. focal neuropathy or radiculopathy. However, as these may also influence mobility and physical function, their specific differentiation from polyneuropathy in this study is less important.

While diabetes and the use of diabetic medication were significantly associated with the presence of neuropathic symptoms and signs, they were not associated with symptomatic sensory polyneuropathy. Other factors such as renal

disease, cancer, use of chemotherapy, alcohol were also not significant. These are likely due to the small number of subjects and possible poor recall in some elderly subjects. A much larger study will be important to elucidate these and other factors further.

The one significant factor associated with sensory polyneuropathy in our subjects was advancing age. The frequency of polyneuropathy increased with increasing age. This is in agreement with findings of changes to the peripheral nerve as a result of aging.¹⁶⁻¹⁸ However, the exact relationship between aging and the development of peripheral neuropathy remains unclear. In chronic idiopathic axonal polyneuropathy, aging did not appear to significantly worsen the neuropathy.¹⁹

In conclusion, the frequency of symptomatic sensory polyneuropathy in a group of subjects 65 years and above in an urban community in Petaling Jaya, Malaysia was 20%. Subjects with polyneuropathy had more postural instability and giddiness. The frequency increased with advancing age suggesting that this may be a factor in its development. A much larger study will be important to confirm this as well as to evaluate associated factors and complications of polyneuropathy in the elderly.

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REFERENCES

- Howell TH. Senile deterioration of the central nervous system. A clinical study. *BMJ* 1949;56-8.
- Jordan B, Cummings JL. Mental status and neurologic examination in the elderly. In: Hazzard WR, Blass JP, Ettinger WH, Jr., *et al*, ed: Principles of geriatric medicine and gerontology. New York: McGraw-Hill; 1999.
- Le Quesne P. Neuropathy due to drugs. In: Dyck PJ, Thomas PK. Eds. Peripheral Neuropathy. 3rd Edition. Philadelphia: W B Saunders, 1993: 1571-81.
- Notermans NC, Wokke JHJ, Franssen H, *et al*. Chronic idiopathic polyneuropathy presenting in middle or old age: a clinical and electrophysiological study of 75 patients. *J Neurol Neurosurg Psychiatry* 1993; 56:1066-71.
- Koski K, Luukinen H, Laippala P, Kivela SL. Risk factors for major injurious falls among the home-dwelling elderly by functional abilities. A prospective population-based study. *Gerontol* 1998; 44:232-8.
- Luukinen H, Koski K, Laippala P, Kivela SL. Predictors for recurrent falls among the home-dwelling elderly. *Scand J Prim Health Care* 1995; 13:294-9.
- Sorock GS, Labiner DM. Peripheral neuromuscular dysfunction and falls in a elderly cohort. *Am J Epidemiol* 1992; 136:584-91.
- Richardson JK, Hurvitz EA. Peripheral neuropathy: a true risk factor for falls. *J Gerontol Med Sci* 1995; 50A:M211-5.
- Bharucha NE, Bharucha AE, Bharucha EP. Prevalence of peripheral neuropathy in the Parsi community of Bombay. *Neurology* 1991; 41:1315-7.
- Beghi E, Monticelli ML, Amoroso L, *et al*. Chronic symmetric symptomatic polyneuropathy in the elderly – a field screening investigation in two Italian regions 1. Prevalence and general characteristics of the sample. *Neurology* 1995; 45:1832-6.
- Mold JW, Vesely SK, Keyl BA, Schenk JB, Roberts M. The prevalence, predictors and consequences of peripheral sensory neuropathy in older patients. *J Am Board Fam Pract* 2004; 17:309-18.
- Lim KS, Bong YZ, Chaw YL, *et al*. Wide range of normality in deep tendon reflexes in the normal population. *Neurol Asia* 2009; 14:21-6.
- Prakash C, Stein G. Neurological signs in the elderly. *Age Ageing* 1973; 2:24-7.
- Impallomeni M, Kenny RA, Flynn MD, Kraenzlin M, Pallis CA. The elderly and their ankle jerks. *Lancet* 1984; 325:670-2.
- Odenheimer G, Funkenstein HH, Beckett L, *et al*. Comparison of neurologic changes in 'successfully aging' vs the total aging population. *Arch Neurol* 1994; 51:573-80.
- Dorfman LJ, Bosley TM. Age-related changes in peripheral and central nerve conduction in man. *Neurology* 1979; 29:38-44.
- Bouche P, Cattelin F, Saint-Jean O, *et al*. Clinical and electrophysiological study of the peripheral nervous system in the elderly. *J Neurol* 1993; 240:263-8.
- Jacobs JM, Love S. Qualitative and quantitative morphology of human sural nerve at different ages. *Brain* 1985; 108:897-924.
- Vrancken AF, Franssen H, Wokke JH, Teunissen LL, Notermans NC. Chronic idiopathic axonal polyneuropathy and successful aging of the peripheral nervous system in elderly people. *Arch Neurol* 2002; 59:533-40.