Original Article

Pain Prevalence in Singapore

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Abstract

Abstract: The prevalence of chronic pain is well described in various parts of the world; primarily in Western societies such as Europe, America and Australia. Little is known of the prevalence of chronic pain within Asia or Southeast Asia. In view of the cultural and genetic variation in pain causation, manifestation and reporting, the findings of previous studies cannot be translated to Asian countries. Prevalence studies needed to be carried out to quantify the magnitude and impact of chronic pain within Asian countries to properly allocate precious health funds to deal with this important healthcare issue. We report the findings of the prevalence study within one Asian country: Singapore. Objective: To determine the prevalence and impact of chronic pain in adult Singaporeans. Materials and Methods: Two sets of questionnaires were designed. The first, a screening questionnaire, to identify the prevalence of chronic pain, and should there be chronic pain; the second, a detailed questionnaire was administered, to characterise the features and the impact of pain. A cross-sectional sampling of Singapore adults were achieved using a computer-based multi-step random sampling of listed telephones numbers. The questionnaires were administered via telephone by a trained interviewer with the aid of a computer-assisted telephone interview system. Results: A total of 4141 screening and 400 detailed questionnaires were completed. The prevalence of chronic pain, defined as pain of at least 3 months' duration over the last 6 months was 8.7% (n = 359). There was a higher prevalence in females (10.9%) and with increasing age. In particular, pain prevalence increased steeply beyond the age of 65 years old. There was a significant impact on work and daily function of those with chronic pain. Conclusion: Though the prevalence of chronic pain was marginally lower compared other studies, the impact of pain was just as significant. In a rapidly ageing population such as Singapore, chronic pain is an important emerging healthcare problem which will likely exert increasing toll on the existing social infrastructure within the next 5 to 10 years.

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Introduction

Population studies on pain prevalence are useful in determining the impact that chronic pain has on the society. It draws the attention of healthcare administrators to chronic pain as a problem and direct healthcare spending accordingly. Previous studies performed using variations in definitions and methodology, yielded rates between 10% and 50%.[1-15] Despite the variation in prevalence rate, the impact of pain to the individual in terms of function and role participation; and to the society, in particular, the proportion of the workforce affected and healthcare utilisation is significant in all studies.[1-15] Almost all these studies were performed in western societies.[1-13] Few studies were carried out in Asia due to the lack of funding and huge logistic involved.[13,14] Genetic, cultural and demographic influences on prevalence of painful chronic conditions, pain manifestation and pain reporting practices prevent accurate extrapolation of western data to Asian countries. A series of prevalence studies were carried out in various Asian countries to understand the impact of pain in Asia. We report the findings of the pain prevalence study on the adult population in Singapore.

Materials and Methods

This cross-sectional population study of persistent pain prevalence was carried out between February 2006 and

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April 2006 by an ISO9002 commercial marketing survey company. The target population was Singaporean adults aged between 18 and 85 years of age who are cognitively able to complete a questionnaire.

A two-staged simple random sampling process was used. Household telephone numbers were selected, using a computer random number generator, from a pool of the nationwide listed residential telephone numbers. A telephone call was made to the selected household. A list of eligible participants within the household was made in order of the date of their birthdays and the participant was randomly chosen from this list using a computer-generated random gird. Should the participant be unavailable at the time of the initial phone call, 2 repeated telephone calls would be made at an agreed time when the participant was most likely to be available before he/she was designated as a non-responder. To ensure correlation of data to the Singapore population, the household telephone number generated were compared and found to correlate closely to the population distribution across various districts within Singapore.

Computer-assisted telephone interviews were carried out by trained and supervised interviewers. The interviews were carried out in English, Mandarin and Malay using questionnaires translated to the respective languages. The questionnaires were translated from English by professional translators and back-translated to English to ensure accuracy of translation.

Two sets of questionnaires were used. The first set, the Listing Questionnaire (LQ), was designed for all respondents. It included questions on demographic parameters such as age, gender and household income as well as questions to detect prevalence of chronic pain. The second set of questionnaires, the Detailed Questionnaire (DQ), was designed for respondents found to have moderate to severe chronic persistent pain. It included questions to describe the characteristic of pain, the impact of pain and the health-seeking behaviour of the respondents.

Our criteria for chronic pain were pain in the last 6 months lasting at least 3 months in duration. While the criteria for moderate to severe chronic persistent pain were:

1) pain in the last 6 months,
2) of at least 3 months' duration,
3) of which 1 month was the month just prior to interview,
4) pain occurring several times a week, and
5) pain was rated at least 4 and above on a 10-point verbal severity scale

Based on data from previous studies,[1-15] we made a conservative estimate of 10% for the prevalence of moderate to severe chronic persistent pain. Singapore is made up of 3 major racial groups (Chinese, Malays and Indians) of which Indians is the minority making up 8.8% of the general population. A sample size of 4000 respondents should give us an approximate of 400 respondents with moderate to severe chronic persistent pain. Assuming there was no racial variation in pain prevalence, about 32 to 36 of these respondents with moderate to severe chronic persistent pain should be Indians. This number should allow us to adequately compare any difference in pain features of moderate to severe chronic persistent pain among the different racial groups.

However during the study, we found that the prevalence of moderate to severe chronic persistent pain was lower than expected. Using the original sampling techniques, we were unable to identify adequate numbers of respondents with moderate to severe chronic persistent pain. We achieved the targeted number of 400 completed DQ using a series of booster interviews. Respondents for the booster interviews were identified using the following methods:

1) Two-stage random sampling as before but instead of going through the whole LQ, they were asked specifically for features of moderate to severe chronic persistent pain. They were enlisted only if they fall into the criteria for moderate to severe chronic persistent pain.
2) When a respondent was found not to have moderate to severe chronic persistent pain, they were asked if anyone in the household or any acquaintance have features of chronic pain. The result was recorded into a separate database of chronic pain sufferers. Respondents were randomly selected from the database during the booster interviews.

A pilot study involving 153 respondents were carried in December 2005. All the 153 respondents were asked the LQ. Three of these respondents fitted the criteria for moderate to severe chronic persistent pain and went on to complete the DQ. The questionnaires were found to be easily understood requiring only minimal modifications. The actual study was carried between February and April 2006.

Data Analysis

The data were analysed using Statistical Package for Social Science (SPSS) version 11.0. Two sets of data were generated from the survey; the LQ and DQ data. The demographic data from the LQ were compared with the demographic data from the Singapore Census 2005. Chi-square test was used to determine statistical significance.

Results

A total of 9523 households were contacted, of which 4149 individuals completed the interview giving a response rate of 43.6% (Fig. 1). Eight questionnaires were discarded due to incomplete data leaving a total of 4141 completed questionnaires. One hundred and thirty-five respondents were found to have moderate to severe chronic persistent

pain and completed the DQ. An additional 265 respondents with moderate to severe chronic persistent pain were identified during the booster interviews which bring the total of completed DQ to 400 (Fig. 1).

The age, gender and racial distribution of the respondents of the LQ were compared with the 2005 Singapore census (Table 1 and Fig. 2). The percentage of females in the respondents is significantly higher ($P = 0.047$) compared to the census population; in particular those in the 40- to 49-year-old age group (Fig. 2). The racial distribution of the respondents is similar to the census with slight excess of Indians and other minority racial groups among the respondents ($P = 0.71$).

The gender and racial distribution of the first 135 respondents of the DQ, identified randomly from the LQ, were compared to the 265 respondents identified in the booster interviews (Table 2). There was no significant difference in distribution of gender in the 2 groups ($P = 0.56$). However, there were significantly larger number of Malays in the booster group ($P = 0.023$) (Table 2).

Three hundred and fifty-nine of the 4141 respondents who had completed the LQ were found to have chronic pain of at least 3 months' duration, giving a prevalence rate of 8.7%. The prevalence rate in females was 10.9% (n = 236), significantly higher ($P = 0.002$) compared to the rate of 7.6% (n = 123) in males. The prevalence of moderate to severe chronic persistent pain within this 4141 respondents was 3.3% (n = 135); 3.8% (n = 82) in females and 2.4% (n = 39) in males.

The prevalence of chronic pain increased with age, reaching an average of 19.7% in those above 65 years old (Fig. 3). The increase was present in both females and males (Fig. 3). The prevalence varied among the racial groups with 11% (n = 44) in Indians, 9.2% (n = 14) in other minority groups, 8.7% (n = 267) in Chinese and 6.4% (n = 34) in Malays (Table 3). This was however not statistically significant ($P = 0.098$). There was significant increase in prevalence of pain in those with the lowest monthly household income (Table 3) ($P = 0.00$).

The major cause of pain was musculoskeletal; 25.7% due to arthritis and 15.5% due to muscle pain (Fig. 4). The main locations of pain were the lower limbs (knee and leg), back

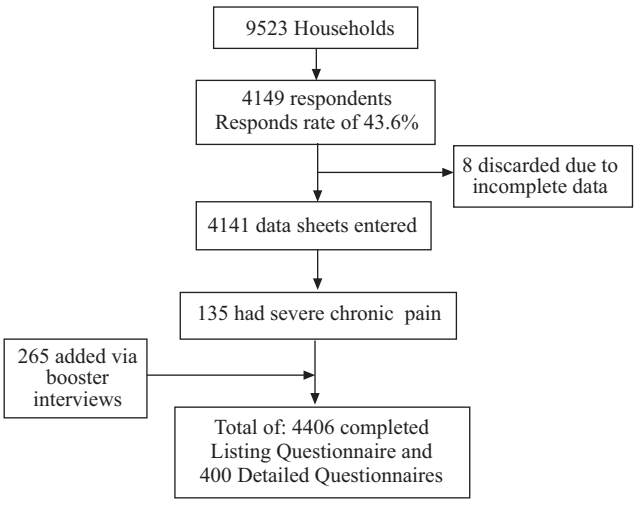

Fig. 1. CONSORT flow diagram for participants.

Table 1. Comparison of Sample Population with Singapore Census

	Percentage of respondents to LQ, % (n = 4141)	% Singapore census
Male	42.2	49.55
Female	57.8*	50.45
Chinese	73.8	75.2
Malay	12.8	13.6
Indian	9.7	8.8
Others	3.7	2.4

* % of female respondents was significantly higher compared to Singapore Census ($P = 0.047$).

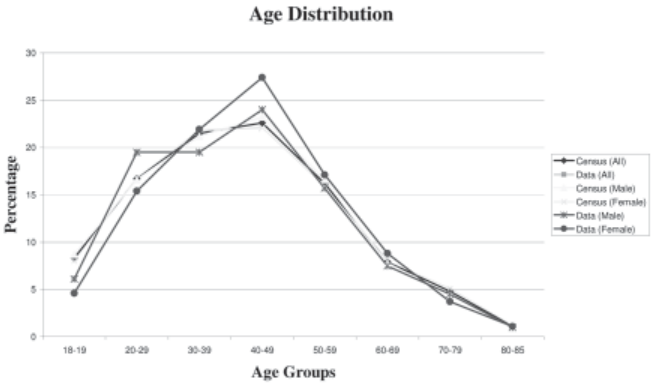

Fig. 2. Age distribution of sample population versus census.

Table 2. Comparison of Respondents in the Booster Interview with Initial Random Interview and Singapore Population Census

	Initial 135 respondents % (n)	Booster interview % (n)	% Singapore census
Male	31.9 (43)	29.1 (77)	49.55
Female	68.1 (92)	70.9 (188)	50.45
Chinese	69.6 (94)	66.8 (177)	75.2
Malay	9.6 (13)	16.2 (43)*	13.6
Indian	17 (23)	16.6 (44)	8.8
Others	3.7 (5)	0.4 (1)	2.4

* Significant number of Malays in the Booster group compared to the initial 135 respondents ($P = 0.023$).

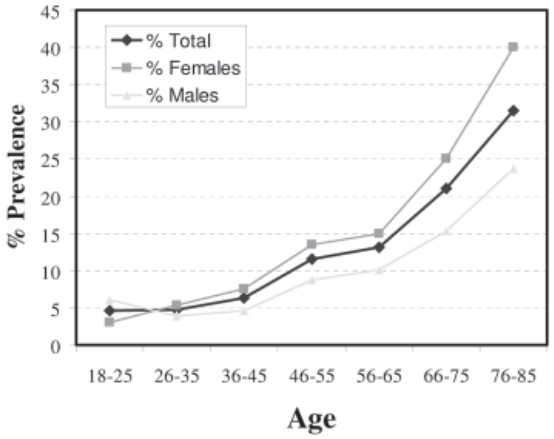

Fig. 3. Prevalence of pain by age distribution.

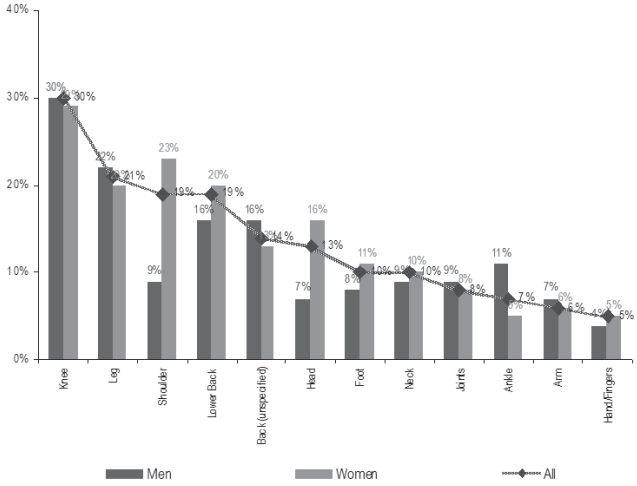

Fig. 4. Pain prevalence by anatomical location of pain.

Table 3. Prevalence of Pain by Gender, Race and Monthly Household Income (MHI)

		% respondents with pain for 3 out of 6 months (n)	
All		8.7	(359)
Gender	Female	10.9	(236)*
	Male	7.6	(123)
Race	Malay	6.4	(34)
	Indian	11	(44)
	Chinese	8.7	(267)
	Others	9.2	(14)
MHI	≤S$1000	18.2	(85)
	S$1000-S$2999	9.0	(83)
	S$3000-S$7999	8.4	(80)
	≥S$8000	6.2	(15)

* The prevalence of pain for 3 months out of the last 6 months was significantly higher in females compared to males (P = 0.002).

Table 4. Absenteeism due to Pain According to Respondent Demographics

		% unable to carry out daily routine work	Average number of days away from routine work
All		41	18.0
Gender	Male	47	20.8
	Female	39	16.5
Age (yrs)	18-35	57	11.7
	36-50	43	9.8
	>50	31	33.0
MHI*	>S$7999	55	8.1
	S$5000-S$7999	53	6.0
	S$3000-S$4999	44	6.2
	<S$3000	38	30.1
Race	Malay	36	19.8
	Chinese	41	12.2
	Indian	45	38.0

MHI*: Mean Household Income

and head (Fig. 4). More than half (52%) of the respondents had pain in 2 or more locations.

Forty-one per cent reported that the pain affected their work. This was more commonly reported in male (47%) compared to females (39%), though it was not statistically significant (P = 0.14) (Table 4). An average of 18 days of sick leave in the last 6 months (14% of working days) was attributed directly due to pain. Seventy-five per cent of them required at least 14 days of medical leave. The number of sick leave taken was higher but not statistically significantly in older respondents, those with a lower household income and the Indians (P = 0.74) (Table 4). In addition, 31.3% reported difficulty working as hard as before while 21.3% were worried about losing their job due to pain.

More than half reported that pain affected their daily activities such as the ability to lift objects (58%), sleep (55%), walk (52%) and exercise (50%). In fact, 38.6% reported difficulty functioning in their normal roles. About 54.6% perceived themselves to have fair to poor health.

Discussion

Most population-based pain prevalence studies were carried in western developed societies. Using various definitions, the prevalence of chronic pain has been found to vary from 10.8% to 50% in previous studies.[1-15] The prevalence rate in Singapore, using the definition of pain

for at least 3 months out of past 6 months, was 8.7% which translates to more than 300,000 adults currently having chronic pain. This is an underestimation as we have not included individuals in nursing homes or those who are cognitively impaired. The prevalence of chronic pain in nursing home residents in Singapore was found to be 42.9% to 48.7% in a previous study.[16]

There was a relationship between pain prevalence, gender, household income and age which was previously observed in other studies.[1-15] Differences in pain prevalence were found in different ethnic groups. The Indians had pain prevalence of 11% which was closer to the Caucasian (or western societies) and slightly higher than the Chinese and Malays. Genetics has role in influencing prevalence of painful chronic conditions as well as severity of pain. Pain reporting may also be cultural. Although this was an interesting observation, it was not statistically significant. Our study may be insufficiently powered to demonstrate a statistical significance.

In this study, we have a low response rate of 43.6%. It may indicate the problems of carrying out a population-based cross-sectional telephone survey. The demographic distribution of the study was similar to but did not adhere strictly to the population distribution based on the Singapore census. In particular, middle-age females (40-49 years old) are over-represented. A slightly higher response rate among female had been observed in another cross-sectional prevalence study.[2] It had been suggested that females were more receptive to telephone surveys leading to their over-representation in such studies.[2]

Due to the low prevalence of moderate to severe chronic persistent pain, we identified less than the predicted number of respondents to undergo the DQ. We needed to identify the remaining 265 respondents using booster interviews. This was potentially a source for error as there was a variation in demographics between the initial 135 respondents from random LQ compared to the later 265 booster interviews. Despite this, our findings correlated with other pain prevalence studies in terms of negative impact to the individual and society.[1,2,7,15,17] Subgroup analysis for the respondents of the DQ was limited by the small numbers involved.

We expect pain prevalence to increase. We noted a strong relationship between increasing age with pain prevalence especially beyond the age of 65 (Fig. 2). The prevalence of pain of those above 65 years old was 19.7% or 1 in 5 individuals. Due to the baby boom following the Second World War, there are a disproportionate number of people in Singapore aged between 40 and 60 years old. In about 5 year's time, the oldest of the baby boomers will reach 65 years old. By 2030, the number of residents aged 65 years or older will increase from the current 300,000 to 900,000 which will be one-fifth of the population.[18] The number of cognitively intact adult residents staying at home with chronic pain will easily increase to 500,000. This number is likely to be higher if nursing home residents are included.

One of the solutions proposed by the Singapore government to maintain economic growth in the face of an ageing population is to keep the older workers employed by raising the official retirement age to 65 years old, with the view for possible future adjustments if indicated.[18] However, chronic pain does impact the workforce increasing both absenteeism and presenteeism.[17] Presenteeism being a situation when an employee is present at work but due to the underlying medical problem is unable to function at his or her normal work capability resulting in a loss of productivity. Within our study population, an average 14% of working hours of those in pain will be spent away from work due to chronic pain. For the hours spent at work, productivity is likely to be diminished due to pain.[17] About one third of our interviewees with pain reported difficulty working as hard as before with a direct negative impact on efficacy.

The social impact of pain in our population is substantial. In our study, more than half found difficulty with simple activities such as sleeping, walking, lifting objects or exercising. In addition, 40% reported some difficulty fulfilling their social roles. This translates to a decrease in ability to self-care which translates to increases in nursing, caring and healthcare facility utilisation. This is vastly important in Singapore's context of rapidly ageing population with declining birth rate.[18]

Conclusion

The chronic pain prevalence of adult Singaporeans was found to be 8.7%. Due to the age distribution of the Singapore population, prevalence of chronic pain will increase significantly within the next 5 to 10 years. Chronic pain has a significant negative impact on the function of the individual and society. We see evidence of how it will impact the economy and increase demands on the healthcare industry in the near future. It is time for healthcare administrators to be mindful of and make appropriate provisions for this emerging problem.

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