

## **Pain and Depression among Hong Kong Chinese Older Adults with Knee Osteoarthritis**

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### *Abstract*

*The aim of this study was to examine the relative contribution of pain, functional disability, sleep problems, and restricted social activity to depression among Chinese older adults with knee osteoarthritis. Cross-sectional analysis of data was conducted from a random sample of 201 older adults with knee osteoarthritis who were interviewed by well-trained interviewers. Almost one third (31.8%) of the 201 subjects reported elevated level of depressive symptoms assessed by Geriatric Depression Scale. Logistic regression analyses revealed that pain and social activity were significantly related to depression, while pain and restricted social activity were persistently associated with depression. This is of particular clinical importance because effective intervention could be developed to enhance social activity, which could break the link between pain and depression in this group of older patients.*

*Keywords: knee pain, depression, elderly Chinese*

### **Introduction**

More than half of older persons aged 65 and above suffer from osteoarthritis or chronic joint symptoms (Mili, Helmick & Zack, 2002) and one common and persistent symptom of osteoarthritis is chronic pain (Badley, 1995) and older persons with osteoarthritis are at increased risk of depression (Dunlop, Lyons, Manheim, Song, & Chang, 2004). In addition, a number of other chronic physical conditions are also known to be highly associated with osteoarthritis, including sleep disturbance (Foley, Ancoli-Israel, Britz, & Walsh, 2004),

functional impairment as well as a restriction in carrying our social activities (James, Miller, Brown, & Weaver, 2005). Pain is a significant predictor of depression in general aged population (Chou & Chi, 2005). Beside pain, sleep disturbance, physical disability, and restricted social activity are all found to be associated with depression in older persons with arthritis (Katz & Yelin, 1995). The objective of the present study was to investigate the relative contribution of pain, sleep disturbance, functional impairment, and restricted social activity to the depression in a sample of Chinese older adults with osteoarthritis (OA) of the knee.

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**Method****Respondents**

Eleven community centers for the elderly in two out of 18 districts in Hong Kong were randomly selected to participate in this study. A random sample of 1,061 of their members aged 65 and above were selected to screen for our target subjects and 791 of them completed the screening. To screen subjects for the study, the inclusion criterion was a medical diagnosis of OA of knee or degenerative joint disease (DJD) of the knee. Moreover, potential participants were excluded if they were cognitively impaired or they reported a diagnosis of rheumatoid arthritis. 254 of those 791 respondents met our inclusion criteria and 201 subjects were successfully interviewed in face-to-face format, yielding a 79.1% response rate from 254 eligible respondents.

**Procedure**

A cross-sectional study method was adopted. The 201 respondents aged 65 and above were interviewed. Three college students were recruited to conduct the interviews. Intensive training and close supervision were provided to these interviewers to increase inter-interviewer reliability. Each interview took about 60 minutes to complete on average.

**Measures****Pain**

The overall intensity of pain associated with OA was measured with five pain-related items of the Chinese version of Arthritis Impact Measurement Verison 2 (AIMS2; Chu et al., 2004). Items were rated on 5-point scale (1-5) and sum scores of these five items

were calculated to create a pain measure such that high scores indicated higher pain. The internal reliability of this scale was 0.70 (Cronbach's alpha).

**Sleep problems**

The degree of difficulty in sleeping was assessed by responses to three items: (a) "To what extent has your arthritis interfered with your sleep?" (on a 6-point scale ranging from 0 = no interference to 5 = very severe interference); (b) "To what extent are you experiencing stress in the area of sleep, not due to arthritis?" (on a 6-point scale ranging from 0 = no stress to 5 = very severe stress); (c) "During the past week, my sleep was restless" (on a 4-point scale ranging from 1 = rarely or none of the time to 4 = most or all of the time. These items were summed to assess the sleep problem in study of patients with arthritis (Nicassio & Wallston, 1992). The Cronbach's alpha for this 3-item scale was 0.70 in the present sample.

**Physical functioning**

Physical functional impairment was assessed by five items related to walking and bending in the Chinese version of the AIMS2 (Chu et al., 2004). All items were rated on 5-point scale (1-5) and these items were summed with higher value indicating higher level of functional disability. These 5 items had a Cronbach's alpha of 0.75.

**Restricted social activity**

The five social activity items from the Chinese version of the AIMS2 (Chu et al., 2004) were used to assess social activity participants engaged in during the past month. All items were rated on 5-point scale (1-5) and sum of these items was calculated with higher values showing lower level of social activity. The internal consistency

(Cronbach's alpha) of this four-item scale was 0.71 in the present study.

**Health indicators**

Self-rated health was assessed by the question "How would you rate your health at the present time?" that was rated on a 5-point scale (1 = excellent, 2 = good, 3 = fair, 4 = poor, 5 = very poor). The presence of nine medical conditions were obtained by asking respondents whether a doctor had ever told them that they had any of nine illnesses: hypertension, heart disease, stroke, diabetes, chronic lung disease, chronic liver disease, chronic kidney disease, urinary infection, and osteoporosis.

**Depression**

The 15-item Geriatric Depression Scale (GDS) was used to measure depressive symptoms (Yesavage & Brink, 1983) and participants were asked about 15 depressive symptoms that they might have experienced in the two weeks preceding the interview. The 15 items were rated on a dichotomous scale from 0 to 1 (0 = no, 1 = yes) and we recoded these items so that 1 refers to the presence of a depressive symptoms and 0 refers to the absence of a depressive symptom in each item. The Chinese version of the 15-item GDS had been validated in previous studies (Boey, 2000). The Cronbach's alpha of this Chinese version of total GDS in the present sample was 0.80. A dummy variable, depression, was formed using the cut-off points of 8 (0 = less than 8 of the GDS scores and 1 = 8 or above of the GDS scores) because the GDS scores were highly skewed to lower end of the scale.

**Demographic variables**

The demographic variables included for further analyses were age, sex (0=male vs.

1=female), marital status (0 = currently not married and 1 = currently married), level of formal education (in years), and personal income (in HK\$).

**Data analysis**

Logistic regression analyses were conducted to evaluate the independent effects of pain, sleep problems, physical impairment in walking and bending, and restriction of social activity on depression. The logistic regression model was also adjusted for socio-demographic variables including age, gender, marital status, education, and personal income as well as two general health indicators: self rated health and the number of medical conditions.

**Results****Characteristics of respondents**

There were more women (77.1%) than men (22.9 %) in this sample. The mean age of the respondents was 75.8 years with a standard deviation of 6.3. Almost half (48.3 %) of the sample were currently married. In terms of socio-economic background, almost 40% of them did not receive formal education at all and only one tenth of them graduated from elementary school. Finally, 64 (31.8%) of these 201 older persons with osteoarthritis of the knee reported elevated depressive symptoms assessed by GDS-15. Mean (standard deviation) or frequency distribution of all independent and dependent variables used in the current study are shown in Table 1.

**Logistic Regression**

To determine the relative contribution of pain, sleep disturbance, physical disability, and restriction of social activity leading to depression, one logistic regression

Table 1

Selected Demographic and Clinical Characteristics of 201 Older Adults Aged 65 and Older by Depression Status.

Characteristics	Older adults with elevated depressive symptoms (GDS ≤ 8) (N = 64)	Older adults without elevated depressive symptoms (GDS < 8) (N = 137)	Total (N = 201)	Chi-square or t-test p Value
<b>Socio-demographic data</b>				
Age (Mean, SD)	75.6 (6.6)	75.9 (6.2)	75.8 (6.3)	NS
Female	75.0%	78.1%	77.1%	NS
Married currently	42.2%	51.1%	48.3%	NS
Year of education	3.1 (4.0)	2.8 (3.6)	2.9 (3.7)	NS
Income (HK\$)	2046.5 (1633.20)	2502.8 (3101.4)	2357.5 (2725.2)	NS
<b>Health indicators</b>				
Self rated health	2.6 (0.8)	3.2 (0.8)	3.0 (0.8)	p < 0.01
Number of illnesses	2.2 (1.1)	1.7 (1.0)	1.9 (1.1)	p < 0.01
<b>Effect of knee pain</b>				
Pain	13.1 (3.8)	10.64 (3.0)	11.4 (3.4)	p < 0.01
Sleep disturbance	9.6 (4.5)	7.0 (3.7)	7.8 (4.1)	p < 0.01
Physical disability	12.7 (5.4)	10.7 (5.0)	11.3 (5.3)	p < 0.05
Social activity	20.4 (2.8)	18.7 (3.0)	19.2 (3.0)	p < 0.01

Note. NS = not significant

model was performed. The findings are presented in Table 2. The logistic model was significant. As can be seen in Table 2, the effects of pain and social activity on depression were statistically significant even though age, gender, marital status, education, income, self-rated health and the number of medical conditions were adjusted. Moreover, self rated health was also significantly related to depression.

**Discussion**

The major concern of this study was to investigate the relative contribution of pain, sleep problems, physical disability

and restricted social activity to depression among Hong Kong Chinese older adults with knee osteoarthritis. Understanding factors that may directly affect depression is critical to developing interventions that prevent depression. Our result shows that pain and social activity are persistently associated with depression in this sample of Hong Kong older adults. The associations are independent of age, gender, marital status, education, income, self-rated health status, and the number of medical conditions.

There is a significant relation between pain and depression in this sample of Chinese older adults with OA of the knee which is

Table 2

Adjusted Association of Pain, Functional Disability, Sleep Problems, and Social Activity With Depression in 201 Older Persons Aged 65 and Older.

Independent Variable	Odds Ratio (95% CI)
Age	0.97 (.91-1.03)
Gender (Female)	0.37 (.14 – 1.01)
Married	0.49 (.22 – 1.08)
Year of education	1.06 (.95 – 1.18)
Income	1.00 ( 1.00 – 1.00)
Self rated health	0.54* ( .33 - .87)
Number of medical conditions	1.01 ( .70 – 1.47)
Pain	1.18** (1.04 – 1.34)
Sleep disturbance	1.07 (.97 – 1.18)
Physical disability	1.02 (.94 – 1.11)
Social Activity	1.23** (1.07 – 1.41)

Note. \* p < 0.05. \*\* p < 0.01.

consistent with previous studies in other aged populations (Geerlings et al., 2002). Even more importantly, our findings suggest that the impact of pain on depression is not mediated by sleep disturbance, physical impairment, social activity, and self rated health status. In other words, these findings are particularly noteworthy in that demographic variables, socio-economic variables, general health indicators, sleep problems, and physical impairment have been statistically controlled in a sample of Chinese older adults with OA of the knee. Another key finding of our study is that social activity is significantly related to the depression which is in line with the results of previous studies that social functioning predict depression in older adults with Rheumatoid Arthritis (Nicassio & Wallston, 1992).

The current study also points to the need for the continued development and implementation of effective interventions that target to reducing pain (American Geriatric Society, 1998) and enhancing social activity participation for older patients with high level of pain (Rapp, Rejeski, & Miller, 2000).

This study has several limitations. As noted earlier, the measurement of pain, disability in walking or bending, and depression were all based on self-reported items. Moreover, we acknowledge that this research is based upon cross-sectional data. Consequently, any conclusion about prediction could only be understood in a statistical and not a causal sense. Longitudinal data (data collected across more than two points of time) is needed to further understand the causal and temporal relations between pain and depression among elderly Chinese people with OA of the knee. Lastly, it should be noted that our sample is comparatively small and concentrated in a single geographic area in Hong Kong and less than desired gender distribution.

**Conclusion**

In summary, pain and restricted social activity are independently associated with depression. Despite of these limitations, the preliminary results reported here nevertheless should encourage other investigators to examine how pain, sleep disturbance, physical disability, and social

activity play significant and independent role in the development of depression among older persons with arthritis in Asian countries

### 摘要

是項研究旨在檢視痛楚、行動不便、失眠、及社交生活限制等對患有膝關節炎的長者在情緒抑鬱上的影響。二百零一位患有膝關節炎的長者接受了我們訓練有素的訪問員面談式訪問。長者抑鬱量表(Geriatric Depression Scale) 顯示大約有三成受訪者有嚴重的抑鬱癥狀。邏輯回歸分析(logistic regression) 顯示只有痛楚及社交生活限制對受訪者的抑鬱癥狀有影響。這結果有積極的臨床意義，顯示若能有效減少痛楚或提高長者的社交生活，均會減低患有膝關節炎長者情緒上的抑鬱。

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