Co-morbidities of patients with knee osteoarthritis

CME

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Objectives To study the co-morbidities of general practice patients with knee osteoarthritis.

Design Cross-sectional study.

Setting Two private general practice clinics in Hong Kong.

Patients All patients presenting at the two clinics were screened for osteoarthritis of the knee based on American College of Rheumatology diagnostic criteria. Patients with osteoarthritis then completed a semi-instructed questionnaire.

Results A total of 455 patients were recruited into the study. Over half (56%) had knee pain plus more than three other diagnostic criteria. Almost all (95%) of the patients with osteoarthritis had no signs of inflammation at the time of screening. Their mean age was 54 years. Overall, 78% of them had at least one musculoskeletal co-morbidity and 82% had at least one non-musculoskeletal co-morbidity. On average they had 3.2 co-morbidities, of which 1.7 were musculoskeletal and 1.5 were non-musculoskeletal. Problems related to the back, upper limbs, neck, and lower limbs were the four most common musculoskeletal co-morbidities, of which neck problems were significantly more common among younger patients (55 years or below) [odds ratio for older to younger patients was 0.62; 95% confidence interval, 0.4-0.9]. The four commonest non-musculoskeletal co-morbidities were cardiovascular, gastro-intestinal, respiratory, and endocrine, of which cardiovascular diseases (odds ratio=8.76; 95% confidence interval, 5.6-13.7), endocrine problems (4.56; 2.8-7.4), and central nervous system diseases (12.74; 1.6-102.8) were significantly likely among older patients (more than 55 years).

Conclusion General practitioners should be alert to the presence of co-morbidities when managing patients with osteoarthritis of the knee.

Introduction

Osteoarthritis (OA) is one of the commonest medical conditions in elderly persons.[1] It is also the most common reason for restricted daily activity[2] and can significantly impact on quality of life.[3] Worldwide estimates suggest that 9.6% of men and 18.0% of women aged 60 years have symptomatic OA of the hips or knees.[4]

While OA is a significant health issue, both locally and abroad, epidemiological data have revealed that there is an important difference in pattern between Caucasian and Chinese populations, with OA knee being more common among Chinese and OA hip among Caucasians. Hoaglund et al[5] observed that in Hong Kong Chinese older than 54 years, the prevalence of OA hip was only 1.2% in men and 0.8% for women, whereas OA knee affected 5% of men and 13% of women. Osteoarthritis of the knee was therefore chosen as the subject of the present study.

A simple definition of co-morbidity is the co-existence of two or more health problems. In the context of general practice, it is not uncommon to see patients with more than one problem, especially among elderly patients. These co-existing health problems can interact with each other and produce high levels of disability and management problems that escalate health care use and costs. Since OA knee is a degenerative condition which is more common with increasing age, patients with this affliction are also likely to suffer from a number of other disabling and chronic conditions.[6] Despite the clinical importance of this issue, there are few local published studies of relevant co-morbidities

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in general practice. Research carried out by the Hong Kong College of Family Physicians in 1998 studied co-morbidity in Hong Kong general practice.[7] That study showed that OA knee was associated only with hypertension (odds ratio [OR]=1.35; 95% confidence interval [CI], 1.06-1.72). This was contradictory to findings from the United Kingdom and Australia, which showed that OA knee patients could have quite extensive musculoskeletal (MSK) and non-MSK co-morbidities.[8,9]

Based on the above, we carried out this study to review the local situation and investigate the relationship between OA knee and its co-existing MSK and non-MSK co-morbidities.

Methods

The study was carried out in two private general practice clinics in Hong Kong from September 2006 to February 2007. Patients were recruited using convenience sampling. All patients presenting to either clinic were screened for a history of knee pain by receptionists. During the consultation, those with a history of knee pain were then further screened by the attending doctor for clinical features of OA knee, using the diagnostic criteria of OA knee established by the American College of Rheumatology (ACR).[10] Patients who were diagnosed to have OA knee were then asked to fill in a semi-instructed questionnaire (with or without assistance from nursing or clerical staff).

The questionnaire (Appendix) consisted of three parts: part I on patient demographic data, part II on patient co-morbidities, and part III on previous use of health care resources. As part III was not related to the theme of this study, only data from parts I and II were analysed and the Statistical Package for the Social Sciences (Windows version 15.0; SPSS Inc, Chicago [IL], US) was used for the statistical analysis.

Results

Overall, 457 patients were recruited into the study; two of whom were excluded because of incorrect data collection.

Diagnosis of osteoarthritis knee

Concerning the diagnostic criteria of OA knee, all our patients had a history of knee pain (a 'must' criterion in the ACR guidelines). Besides having knee pain, 43.7% fulfilled the minimum of three other criteria, whereas the remaining 56.3% presented with more than three such diagnostic criteria (Table 1). The most common criteria were the presence of crepitus on bony motion and the absence of significant morning stiffness. Notably, 95.4% of the OA knee patients had no signs of inflammation at the time of screening.

膝關節骨性關節炎的並存疾病

目的　探討普通科門診有膝關節骨性關節炎的病人的並存疾病。

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患者　按American College of Rheumatology的診斷準則，為到兩所普通科門診診所所有的病人作膝關節骨性關節炎的篩選。並在有或無醫護人員或護士指導下，邀請患有骨性關節炎的病人填寫問卷。

結果　455名病人中，一半以上（56%）有膝關節痛及符合超過三項診斷準則。幾乎所有（95%）膝關節痛病人在篩選時沒有炎症徵狀；他們平均年齡54歲。總括來說，78%病人至少有一種肌胳系統的並存病，82%病人至少有一種非肌胳系統的並存病。他們平均有3.2種並存病，其中1.7種屬肌胳系統，1.5種屬非肌胳系統。四種最普遍肌胳系統的並存病與背部、上肢、頸部，以及下肢有關，其中頸部問題明顯地普遍出現於55歲或以下的病人（比值比0.62；95%置信區間：0.4至0.9）。四種最普遍非肌胳系統的並存病與心血管、腸胃、呼吸，以及內分泌系統有關，其中心血管疾病（比值比8.76；95%置信區間：5.6至13.7）、內分泌病（4.56；2.8至7.4）、和中樞神經疾病（12.74；1.6至102.8）明顯地多出現於55歲以上的病人。

結論　當有膝關節骨性關節炎的病人求診時，醫生應注意病人可能有其他並存疾病。

TABLE 1. Patients' osteoarthritis knee symptoms for classification

Osteoarthritis knee symptom	No. (%) of patients (n=455)
ACR* clinical classification criteria of osteoarthritis†	
(a) Knee pain (must criteria)	455 (100)
(b) >50 Years old	277 (60.9)
(c) <30 Minutes of morning stiffness	375 (82.4)
(d) Crepitus on active motion	436 (95.8)
(e) Bony tenderness	141 (31.0)
(f) Bony enlargement	114 (25.1)
(g) No palpable warmth of synovium	434 (95.4)
No. of criteria fulfilled (other than knee pain)	
3	199 (43.7)
4	138 (30.3)
5	80 (17.6)
6	38 (8.4)

* ACR denotes American College of Rheumatology
† Osteoarthritis knee is defined by ACR as pain in the knee (must), and at least three of the criteria listed as (b) to (g)

Demographic data

Approximately 70% of the studied population were

TABLE 2. Body mass index (BMI) of patients

	BMI No. (%)		BMI (kg/m²) Mean (SD)	Independent t test
	<23 kg/m²	≥23 kg/m²		
Sex				
Female (n=317)	115 (36.3%)	202 (63.7%)	24.3 (3.7)	
Male (n=138)	30 (21.7%)	108 (78.3%)	25.0 (3.7)	
Age (years)				
≤55 (n=275)	109 (39.6%)	166 (60.4%)	24.1 (4.0)	P<0.05
>55 (n=180)	36 (20.0%)	144 (80.0%)	25.2 (3.2)	
Overall (n=455)	145 (31.9%)	310 (68.1%)	24.5 (3.7)	

female and 30% male. The mean age of the whole group was 54 (standard deviation [SD], 13) years. Corresponding figures for males and females were 53 (SD, 13) and 54 (SD, 13) years, respectively.

Using the criteria that a body mass index (BMI) of 23 kg/m² and 25 kg/m² are the cut-off values to define overweight and obesity, respectively in the Hong Kong Chinese population,[11] the majority of the patients (68.1%) had a BMI of 23 kg/m² or above (mean, 24.5; SD, 3.7 kg/m²). There was no significant difference in BMI between males (mean, 25.0; SD, 3.7 kg/m²) and females (mean, 24.3; SD, 3.7 kg/m²) [Table 2].

By sub-dividing the patients into two age-groups (aged >55 and ≤55 years), the majority in both groups had BMIs of 23 kg/m² or more (60.4% in those aged ≤55 years and 80.0% in those aged >55 years). Table 2 shows that the mean (SD) BMIs of the respective patient groups were 25.2 (3.2) and 24.1 (4.0); the difference being statistically significant.

The co-morbidities

In this study, OA knee patients had on average 3.2 co-morbidities, of which 1.7 were MSK and 1.5 were non-MSK. Overall, 78% of the patients had at least one MSK co-morbidity, and 82% had at least one non-MSK co-morbidity. Older patients (>55 years) had significantly more non-MSK co-morbidities than those who were younger (≤55 years) [mean difference, -0.69; 95% CI, -0.9 to -0.5]. An unexpected finding was that the same older patients had significantly fewer MSK co-morbidities than the younger patients (mean difference, 0.23; 95% CI, 0.0 to 0.5) [Table 3].

Problems related to the back, upper limbs, neck, and lower limbs were the four most common MSK co-morbidities in both patient groups. A significantly greater proportion of younger OA knee patients had neck problems than those who were older (OR=0.62; 95% CI, 0.4-0.9).

For non-MSK co-morbidities, the four

commonest categories were cardiovascular (33%), gastro-intestinal (29%), respiratory (27%), and endocrine (21%). Among these, central nervous system diseases (eg stroke) were approximately 13 times as common (OR=12.74; 95% CI, 1.6-102.8). Cardiovascular diseases (eg hypertension) were about 9 times as common (OR=8.76; 95% CI, 5.6-13.7), and endocrine problems (eg diabetes) about 5 times as common (OR=4.56; 95% CI, 2.8-7.4). These three co-morbidities were significantly more common in older than younger patients. Approximately one third of OA knee patients in both age-groups had co-existing gastro-intestinal problems. The OA knee patients who were overweight or obese had significantly more cardiovascular disorders (OR=3.05; 95% CI, 1.9-4.9), endocrine problems (OR=2.41; 95% CI, 1.4-4.2), and mental problems (such as depression) [OR=2.23; CI 1.1-4.4] than individuals with BMIs that were not excessive.

Discussion

In our study, the mean age of our patients was 54 years, and 70% were female. These figures are in concordance with previous large studies in which older adults (aged >55 years) had radiographic evidence of OA[12] and women had more OA knees than men.[13] Obesity is a well-known powerful risk factor of OA knee.[14] This was also reflected in our study, in that the majority (68.1%) were either overweight or obese; the overall mean BMI being 24.5 kg/m².

Since OA knee is an age-related condition, other co-existing MSK problems can be expected.[15] Unexpectedly, our older patients (>55 years) had significantly fewer MSK co-morbidities than those who were younger (mean difference, 0.23; 95% CI, 0.0-0.5) [Table 3]. Further analysis revealed that this was due to a significantly higher percentage of neck problems in the younger patient group; the OR for neck problems in the older versus younger patients being 0.62 (95 CI, 0.4-0.9). High quantitative job demands, low social support at work, job insecurity, low physical capacity, poor computer workstation design and work posture, sedentary work positions, repetitive work, and precision work have all been associated with neck pain.[16] One possible reason is that most of the younger patients attending the two general practice clinics belonged to the working class. Further studies are needed to look into the relationship between neck problems and OA knee.

Our study showed that cardiovascular, gastro-intestinal, respiratory, and endocrine problems were the four most common non-MSK co-morbidities in OA knee patients; cardiovascular problems being most common. This is consistent with similar findings from previous local and overseas studies.[7,9] A similar study to ours conducted in a general practice in the Netherlands found that chronic conditions like

TABLE 3. Proportion of patients with musculoskeletal (MSK) and non-MSK co-morbidities[*]

	Overall (n=455) No. (%)	BMI				Age			
		<23 (kg/m²) (n=145) No. (%)	≥23 (kg/m²) (n=310) No. (%)	OR[†]	95% CI of OR	≤55 years (n=275) No. (%)	>55 years (n=180) No. (%)	OR[†]	95% CI of OR
MSK co-morbidities (78% of patients had at least one MSK co-morbidity)									
Back (eg low back pain)	234 (51)	77 (53)	157 (51)	0.91	0.6 to 1.4	147 (53)	87 (48)	0.81	0.6 to 1.2
Upper limbs (eg tennis elbow)	230 (51)	79 (54)	151 (49)	0.79	0.5 to 1.2	140 (51)	90 (50)	0.96	0.7 to 1.4
Neck (eg neck pain)	164 (36)	63 (43)	101 (33)	0.63[‖]	0.4 to 0.9	111 (40)	53 (29)	0.62[‖]	0.4 to 0.9
Lower limbs (eg ankle pain)[‡]	126 (28)	42 (29)	84 (27)	0.91	0.6 to 1.4	83 (30)	43 (24)	0.73	0.5 to 1.1
Others (eg fractured hips)	24 (5)	7 (5)	17 (5)	1.14	0.5 to 2.8	14 (5)	10 (6)	1.10	0.5 to 2.5
Non-MSK co-morbidities (82% of patients had at least one non-MSK co-morbidity)									
Cardiovascular (eg hypertension)	150 (33)	26 (18)	124 (40)	3.05[‖]	1.9 to 4.9	41 (15)	109 (61)	8.76[‖]	5.6 to 13.7
Gastro-intestinal (eg ulcers)	132 (29)	46 (32)	86 (28)	0.83	0.5 to 1.3	83 (30)	49 (27)	0.87	0.6 to 1.3
Respiratory (eg asthma)	123 (27)	50 (34)	73 (24)	0.59[‖]	0.4 to 0.9	79 (29)	44 (25)	0.80	0.5 to 1.2
Endocrine (eg diabetes)	97 (21)	18 (12)	79 (25)	2.41[‖]	1.4 to 4.2	31 (11)	66 (37)	4.56[‖]	2.8 to 7.4
Mental (eg depression)	59 (13)	11 (8)	48 (15)	2.23[‖]	1.1 to 4.4	43 (16)	16 (9)	0.53[‖]	0.3 to 1.0
Neoplasm (eg different types of cancer)	30 (7)	9 (6)	21 (7)	1.10	0.5 to 2.5	19 (7)	11 (6)	0.88	0.4 to 1.9
Autoimmune (eg rheumatoid arthritis)	13 (3)	6 (4)	7 (2)	0.54	0.2 to 1.6	5 (2)	8 (4)	2.51	0.8 to 7.8
Central nervous system (eg stroke)[§]	9 (2)	1 (1)	8 (3)	3.81	0.5 to 30.8	1 (0.4)	8 (4)	12.74[‖]	1.6 to 102.8
Others	45 (10)	15 (10)	30 (10)	0.93	0.5 to 1.8	21 (8)	24 (13)	1.86[‖]	1.0 to 3.5
	Overall Mean (SD)	BMI				Age			
		<23 (kg/m²) Mean (SD)	≥23 (kg/m²) Mean (SD)	MD	95% CI of the MD	≤55 years Mean (SD)	>55 years Mean (SD)	MD	95% CI of the MD
No. with different types of co-morbidities									
Musculoskeletal co-morbidities (out of the 5 types mentioned above)	1.7 (1.2)	1.9 (1.3)	1.7 (1.2)	0.20	-0.04 to 0.4	1.8 (1.2)	1.6 (1.2)	0.23[‖]	0.0 to 0.5
Non-musculoskeletal co-morbidities (out of the 9 types mentioned above)	1.5 (1.2)	1.3 (1.0)	1.5 (1.2)	-0.28[‖]	-0.5 to -0.1	1.2 (1.0)	1.9 (1.2)	-0.69[‖]	-0.9 to -0.5
All co-morbidities (out of the 14 types mentioned above)	3.2 (1.9)	3.1 (1.9)	3.2 (1.9)	-0.08	-0.4 to 0.3	3.0 (1.8)	3.4 (1.9)	-0.46[‖]	-0.8 to -0.1

[*] BMI denotes body mass index, OR odds ratio, CI confidence interval, SD standard deviation, and MD mean difference

[†] Interpretation of the OR—for the two BMI subgroups: OR>1 indicates patients with BMI≥23 were more likely to have that co-morbidity, OR<1 indicates patients with BMI≥23 were less likely to have that co-morbidity; for the two age subgroups: OR>1 indicates patients aged >55 were more likely to have that co-morbidity, OR<1 indicates patients aged >55 were less likely to have that co-morbidity

[‡] Knee pain was not included

[§] For patients aged ≤55 years or BMI<23 kg/m², the number of patients who had central nervous system co-morbidities was less than 5

[‖] P<0.05

diabetes mellitus and heart diseases were associated with OA.[17] Obesity, a known risk factor for OA knee, may explain this association, since it is also a risk factor for diabetes, heart disease, and hypertension. In our study, gastro-intestinal disorder (eg ulcer disease) was the second most common OA knee–related co-morbidity, which was present in about one third of our patients (irrespective of their age or BMI). Such a high prevalence calls for judicious use of non-steroidal anti-inflammatory drugs (NSAIDs) among OA knee patients. A population-based case control study conducted in the United States demonstrated that, after 10 years' follow-up, OA patients had significantly more peptic ulcer disease and renal disease; the most likely cause being the use of NSAIDs.[18]

The limitation of this study was that it was a one-armed cross-sectional investigation. Although we demonstrated that OA knee was significantly associated with both MSK and non-MSK co-morbidities, further case control studies are required to establish that OA knee is independently associated with these co-morbidities. As all data in this study were drawn from only two private general practice clinics whose patient demographics may be different from those of government out-patient clinics, there could be sampling bias related to our locality. Hence the generalisability of the ORs we calculated may be limited.

Conclusion

The Chinese patients in our study shared the same risk factors for OA knee as reported by others. Our OA knee patients were likely to be elderly and have multiple concomitant health-related problems. These co-morbidities can interact with each other to produce high levels of disability, eg the increased pain and reduced mobility, particularly from MSK co-morbidities. Moreover, co-morbidities also lead to management problems, eg drug safety issues owing to the presence of cardiovascular co-morbidity and the prescription of COX-2 inhibitors, gastro-intestinal co-morbidity, and the use of NSAIDs. Primary care

physicians should be alert to the presence of co-morbidities and consider their impact when managing patients with OA knee.

Appendix

Additional material related to this article can be found on the HKMJ website. Please go to <http://www.hkmj.org>, search for the appropriate article, and click on

Full Article in PDF following the title.

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APPENDIX. Questionnaire on the management of osteoarthritis of the knee

Q1 Criteria for OA knee by history and physical examinations:

Adopted from American College of Rheumatology Clinical Classification Criteria of Osteoarthritis of the Knee. (Reference: Altman, R, et al.: Arthritis Rheum 29:1039, 1986)

1. Pain in the knee (Must) ☐[1]

   And at least 3 of the followings

2. Over 50 years old ☐[2]
3. Less than 30 minutes of morning stiffness ☐[3]
4. Crepitus on active motion ☐[4]
5. Bony tenderness ☐[5]
6. Bony enlargement ☐[6]
7. No palpable warmth of synovium ☐[7]

Part I: Demographic data

Q2a Age: _____

Q2b Sex: Female ☐[1]   Male ☐[2]

Q2c Weight: _____kg

Q2d Height: _____cm

Q2e BMI: _____

Part II: Co-morbidities

Musculoskeletal co-morbidities:

Q3a Neck (e.g. neck pain)

   No.   ☐[1]

   Yes. ☐[2] (Please specify): _____

   No medication ☐[1]   Occasional medication ☐[2]   Medication > once a week ☐[3]   Daily medication ☐[4]

Q3b Back (e.g. LBP)

   No.   ☐[1]

   Yes. ☐[2] (Please specify): _____

   No medication ☐[1]   Occasional medication ☐[2]   Medication > once a week ☐[3]   Daily medication ☐[4]

Q3c Upper limbs   (e.g., tennis elbow)

   No.   ☐[1]

   Yes. ☐[2] (Please specify): _____

   No medication ☐[1]   Occasional medication ☐[2]   Medication > once a week ☐[3]   Daily medication ☐[4]

Q3d Lower limbs (e.g., ankle pain)

   No.   ☐[1]

   Yes. ☐[2] (Please specify): _____

   No medication ☐[1]   Occasional medication ☐[2]   Medication > once a week ☐[3]   Daily medication ☐[4]

Q3e Others (e.g., fractures hips)

   No.   ☐[1]

   Yes. ☐[2] (Please specify): _____

   No medication ☐[1]   Occasional medication ☐[2]   Medication > once a week ☐[3]   Daily medication ☐[4]

Non-musculoskeletal co-morbidities:

Q4a CVS (e.g., HT, IHD)

   No.   ☐[1]

   Yes. ☐[2] (Please specify): _____

   No medication ☐[1]   Occasional medication ☐[2]   Medication > once a week ☐[3]   Daily medication ☐[4]

Q4b Endocrine (e.g., DM)

   No.   ☐[1]

   Yes. ☐[2] (Please specify): _____

   No medication ☐[1]   Occasional medication ☐[2]   Medication > once a week ☐[3]   Daily medication ☐[4]

Q4c CNS (e.g., CVA, Parkinsonism)

No. □¹

Yes. □² (Please specify): _____

No medication □¹   Occasional medication □²   Medication > once a week □³   Daily medication □⁴

Q4d Respiratory (e.g., asthma)

No. □¹

Yes. □² (Please specify): _____

No medication □¹   Occasional medication □²   Medication > once a week □³   Daily medication □⁴

Q4e Neoplasm

No. □¹

Yes. □² (Please specify): _____

No medication □¹   Occasional medication □²   Medication > once a week □³   Daily medication □⁴

Q4f Mental (e.g., depression)

No. □¹

Yes. □² (Please specify): _____

No medication □¹   Occasional medication □²   Medication > once a week □³   Daily medication □⁴

Q4g GI (e.g., ulcers)

No. □¹

Yes. □² (Please specify): _____

No medication □¹   Occasional medication □²   Medication > once a week □³   Daily medication □⁴

Q4h Autoimmune (e.g., RA)

No. □¹

Yes. □² (Please specify): _____

No medication □¹   Occasional medication □²   Medication > once a week □³   Daily medication □⁴

Q4i Others

No. □¹

Yes. □² (Please specify): _____

No medication □¹   Occasional medication □²   Medication > once a week □³   Daily medication □⁴

Q5a What medication(s) do you take regularly for the above co-morbidities (except knee pain)?

_____

_____

_____

_____

Q5b What medication(s) do you take regularly for the knee pain?

_____

Part III: Health seeking behaviour

Q6 What treatment(s) that you have received for your knee pain? (can select more than one)

□¹ General Practitioners   □⁵ Government Clinics

□² Orthopaedics   □⁶ Physiotherapy

□³ Self medicated   □⁷ Bone Setters

□⁴ Chinese herbalist   □⁸ Acupuncturist

□ Others _____

_____