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所附文章選自物理治療雜誌之前言部分。

1) 請簡述每段落之摘要。(20%)
2) 請說明每段落與主題的相關。(10%)
3) 請說明前後段落間之關連性。(20%)

Maximal voluntary and functional performance levels needed for independence in adults aged 65 to 97 years

Cress et al. 2003, *Physical Therapy*; 83, 37-58

Age-related loss of muscle mass and cardiovascular endurance can lead to impairments in muscle force production and cardiac function that, in turn, limit function, such as activities essential to everyday living.(1-3) These relationships are often described in the context of the disablement model, where "disability" refers to difficulties in carrying out socially defined tasks.4 Underlying impairments (eg, lack of muscle force or endurance) often contribute to functional limitations (eg, being unable to walk to stores).(5) These disabilities can even lead to institutionalization.(6) When predicting disability, the importance of accounting for demands of the tasks a person needs to accomplish is often overlooked.(7) Depending on the difficulties encountered, disability may occur due to environmental demands.(8) While aging in the same environment, an individual may eventually have difficulty negotiating home and community in order to fulfill daily needs unless modifications in those environments take place. For example, limitations in walking, driving, or taking a bus may impede a person's ability to obtain groceries and, therefore, to live without assistance in a single-family dwelling.(8)

In this article, we examine (3) levels of the disablement model: impairment, functional limitation, and disability. For impairment in our study, we measured maximal voluntary performance for aerobic capacity and maximal voluntary muscle torque. Aerobic capacity is reported as peak oxygen consumption,(9) and muscle torque is reported as maximal voluntary muscle torque for the quadriceps femoris muscles.(10) Protocols for maximal voluntary performance measures were developed in an effort to isolate the variable of interest-aerobic capacity or maximal voluntary force-and to minimize the influence of other factors. When these protocols are adhered to strictly, these continuous-scale measures are reproducible and valid.(9,10) In our view, the advantages of these measures are that they are well-established markers of physical conditioning that are frequently reported in the literature. Functional limitations have been defined as the gap between a person's capabilities and the demands of the environment.(11) The "functional limitation" component of the disablement model was assessed using (2) methods: measurement of performance-based physical function and measurement of self-reported physical function.

We use the term "physical function" to refer to the continuous-scale performance-based measure of everyday tasks important for living independently. The term "functional limitation" is used exclusively when referring to self-reported limitation in the ability to do tasks necessary for basic activities-of-daily living. The "disability" component of the disablement model is reported as a dichotomous independent-dependent variable based on the level of function limitation reported. Living environment is also reported. Participants resided in detached single-family houses, were community dwellers, or resided in continuous care retirement facilities.

Maximal voluntary performance declines begin in the fourth decade,(12) whereas marked increases in the prevalence of disability associated with aging do not occur until after the age of 75 years.(13) The delay in the loss of function relative to that of the loss of maximal voluntary performance, in our opinion, may be attributed to physical reserve (ie, maximal voluntary performance in excess of that needed to perform daily functions). Physical reserve can provide a "margin of safety" against functional decline.(14) Below the threshold, function decreases are more closely associated with loss of maximal voluntary performance.(15) Age-related loss of maximal voluntary performance, in our view, erodes physical reserves. Williamson and Fried(16) contended that, in the early stages of physical decline, people use modification strategies to cope with the demands of independent living (eg, cooking fewer meals, using only a portion of the home). Modification strategies most likely can forestall disability for a limited period of time in most people16; however, reserves depleted below the level required by daily demands can eventually lead to disability, depending on the environment.(15)

In this article, we provide an analysis of the relationship between commonly reported measures of maximal voluntary performance and what we view as clinically relevant measures of physical function. The first purpose of our study was to explore the relationships between the measures of maximal voluntary performance and physical function in order to identify the breakpoint or threshold between physical function and (2) maximal voluntary performance measures. The second purpose of our study was to evaluate the utility of using the threshold to assess the "ability to live independently," based on self-reported function in older adults with a broad range of abilities.

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一般醫學論文投稿時，必須撰寫摘要，醫學論文之摘要是有字數限制的。以下1-4 子題之答案即可構成本閱讀文章之摘要，因此，此 4 子題之答案，請勿超過600 中文字。若有不易以中文表達之名詞，可以原文作答，其換算之中文字數由閱卷者統一決定。

1. 由題目 (Hip Adductor Muscle Strength in Patients with Varus Deformed knee) 與所提供之文章內容，您認爲本研究目標爲何？（8%）
2. 請用一段文字敘述本研究之方法。(15%)
3. 請用一段文字敘述本研究之結果。(10%)
4. 請用一段文字敘述您認爲的本研究之結論。(7%)
5. 請給本文 2 個以上關鍵詞。(5%)
6. 當您引用這篇論文時，請問您如何將它寫在參考文獻中？（5%）

接背面

LIPPINCOTT WILLIAMS & WILKINS
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Hip Adductor Muscle Strength in Patients With Varus Deformed Knee

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MATERIALS AND METHODS

Subjects

Muscle strength around the knee was measured in 49 osteoarthritic knees of 32 women; 17 knees were affected with osteoarthritis bilaterally (Osteoarthritis Group). There was no history of any medication, surgical treatments, or physical therapy before admission to the hospital. The mean age of the patients at the initial visit was 62.3 years, ranging from 43 to 78 years.

The other group (Control Group) consisted of 13 knees of 13 women with no history of knee disease. The 13 knees were used as controls for comparison with the Osteoarthritis Group. The mean age of the Control Group was 60.5 years, ranging from 49 to 73 years (Table 1).

Subjects with any serious complications or pain in the ipsilateral hip, ankle, or patellofemoral joint were excluded from the study.

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Measurement of Femorotibial Angle and Grading of Osteoarthritis

Anteroposterior radiographs of the knees during one-leg standing were taken, and the femorotibial angle 2,10,13 was measured as a parameter to assess limb alignment. A straight line was drawn along the axis of the femoral midshaft to intersect a corresponding line drawn through the axis of the tibial midshaft. The lateral angle around the intersection between these two lines was measured as a femorotibial angle.

The advancement of medial compartmental knee osteoarthritis in the osteoarthritis group was classified using the following radiographic grading system 12 (modified Ahlbäck's criteria 1). The system has six grades: Grade 0, normal appearance; Grade 1, bone sclerosis or osteophyte formation; Grade 2, joint space narrowing less than 3 mm; Grade 3, obliteration of joint space or subluxation; Grade 4, bony wear on tibial plateau less than 5 mm; and Grade 5, more than 5 mm of bony wear. Here, subluxation indicated the condition in which the medial edge of the medial tibial plateau showed a lateral shift by more than 5 mm against the medial edge of the articular surface of the medial femoral condyle without including osteophyte. According to this classification, 17 knees were classified as Grade 1, 23 as Grade 2, and nine as Grade 3 (Table 1).

Measurements of Muscle Strength

Isometric muscle strength was measured by using a Musculater GT-50 (OG-giken, Okayama, Japan), in which pushing-up force against a pad was calculated by an electrical sensor with a measuring accuracy of within 3%.

To measure isometric quadriceps muscle strength, each patient was in the supine position and raised her leg with the knee extended by pushing up an electrical sensor-fixed pad which was applied to their ankle (Fig 1A). The measurement was repeated three times at 10-second intervals. Similarly, isometric hamstring muscle strength was measured with each patient in the prone position with knee flexion (Fig 1B). Isometric muscle strength of the hip adductors, which includes adductor magnus, adductor brevis, and adductor longus, was measured in the lateral position with hip adduction (Fig 1C). Isometric muscle strength of hip abductors, the gluteus medius, also was measured in the lateral position (Fig 1D). Setting of the patient's position, equipment, and measurement were done by the same investigator to ensure accuracy.

Statistical Analysis

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All measured variables and subjects' data were entered in a computer database (StatView for Macintosh, Version 5, Abacus Concepts, Inc, Berkeley, CA). In consideration of the differences in body weight and body height of the subjects, each muscle strength was converted into the absolute value and the ratio between the two opposing muscles. For example, the ratio of quadriceps to hamstring strength was obtained by dividing quadriceps strength by hamstring strength. The ratios of adductor to hamstring strength and abductor to hamstring strength were calculated in the same way. One-way factorical analysis of variance (ANOVA) and multiple comparison tests were done with the same program to analyze the results. A p value less than 0.05 was considered significant.

RESULTS

Patient Profiles

The mean of the femorotibial angle in the osteoarthritis group was 179.8° (0.2° anatomic valgus angulation), ranging from 173° to 189°, which was significantly greater (more varus tendency) than the mean of the control group of 174.7° (5.3° anatomic valgus angulation), ranging from 172° to 177° ($p < 0.01$). The femorotibial angle was shown to increase as the severity of osteoarthritis progressed (Fig 2).

There were no significant differences in body height ($p = 0.62$) and weight ($p = 0.51$) between the two groups (Table 1).

Comparison of Muscle Strength Between Two Groups

The mean quadriceps strength in Grade 2 knees (6.0 kg) was significantly smaller than that in Grade 0 knees (8.3 kg) ($p < 0.05$). However, there was no significant difference in the quadriceps to hamstrings ratio between each grade (Table 2). The adductor to hamstrings ratio in the osteoarthritis group (0.81) was significantly greater than that in the control group (0.59) ($p < 0.01$) (Fig 3). The adductor to hamstrings ratio in Grade 3 knees (1.04) was significantly greater than that in Grade 0 (0.59) ($p < 0.01$), Grade 1 (0.72) ($p < 0.05$), and Grade 2 knees (0.79) ($p < 0.05$), and the adductor to hamstrings ratio in Grade 2 knees was significantly greater than that in Grade 0 knees ($p < 0.05$) (Table 2, Fig 4).

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TABLE 1. Parameter in Two Groups*Mean ± standard deviation, with range in parentheses.FTA = femorotibial angle.

TABLE 2. Muscle Strength and Muscle Strength Ratio*Mean ± standard deviation; Q/H = Ratio of quadriceps to hamstrings strength; Add/H = Ratio of adductors to hamstrings strength; Abd/H = Ratio of abductors to hamstrings strength

Fig 1A–D. (A) Method of measurement of quadriceps strength. Isometric strength of the quadriceps is measured using a Musculater GT-50 (OG-giken, Okayama, Japan) with the patient in the supine position. Each patient raised her leg with the knee extended by pushing an electrical sensor fixed pad applied to the ankle. (B) Method of measurement of the hamstring strength. Isometric strength of the hamstrings is measured with the patient in the prone position with knee flexion. (C) Method of measurement of hip adductor strength. Isometric hip adductor muscle strength is measured against hip adduction with the patient in the lateral position. (D) Method of measurement of hip abductor strength. Isometric hip abductor muscle strength is measured against hip abduction with the patient in the lateral position.

Fig 2. Mean standing femorotibial angle (FTA) in each grade. Feorotibial angle of osteoarthritic knees was shown to increase with advancement of the osteoarthritic grade. († $p < 0.01$ by one-way factorial ANOVA and multiple comparison test.)

Fig 3. Muscle strength ratio in each group. Adductor to hamstrings ratio in Osteoarthritis Group (0.81 ± 0.30) was significantly greater than that in the Control Group (0.59±0.16, p. < 0.01). († $p < 0.01$ by one-way factorial ANOVA and multiple comparison test.)

Fig 4. Adductor to hamstrings ratio in each grade. Adductor to hamstrings ratio in Grade 3 knees (1.04±0.32) was significantly greater than that in Grade 0 (0.59±0.16, $p < 0.01$), Grade 1 (0.72±0.18, $p < 0.05$) and Grade 2 knees (0.79±0.33, $p < 0.05$), and adductor to hamstrings ratio in Grade 2 knees was significantly greater than that in Grade 0 knees. († $p < 0.01$ and * $p < 0.05$ by one-way factorial ANOVA and multiple comparison test.)

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TABLE 1. Parameter in Two Groups

Group	Numbers of Patients and knees	Age* [Years]	FTA in Standing* [Degrees]	Height* [Cm]	Weight* [Kg]
Osteoarthritis	32 women, 49 knees	62.3 ± 8.0 (43–78)	179.8 ± 4.3 (173–189)	152.0 ± 4.8 (140–161)	57.7 ± 6.9 (47.5–79)
Grade 1	14 women, 17 knees	58.1 ± 8.7 (43–70)	176.1 ± 2.4 (173–181)	151.5 ± 4.2 (140–158)	57.4 ± 7.6 (48–79)
Grade 2	16 women, 23 knees	63.5 ± 6.7 (47–78)	180.2 ± 3.0 (175–187)	152.3 ± 5.5 (143–161)	57.8 ± 7.8 (47.5–79)
Grade 3	5 women, 9 knees	67.0 ± 6.7 (59–78)	185.8 ± 3.0 (180–189)	152.2 ± 4.7 (143–156)	58.1 ± 2.5 (55–63)
Control	13 women, 13 knees	60.5 ± 6.5 (49–73)	174.7 ± 1.4 (172–177)	151.2 ± 4.8 (140–158)	56.3 ± 5.0 (50–66)

*Mean ± standard deviation, with range in parentheses.
FTA = femorotibial angle.

TABLE 2. Muscle Strength and Muscle Strength Ratio

Group	Quadriceps* [kg]	Adductors* [kg]	Abductors* [kg]	Hamstrings* [kg]	Q/H*	Add/H*	Abd/H*
Osteoarthritis	6.7 ± 2.4	6.4 ± 2.7	8.0 ± 2.7	8.3 ± 3.4	0.90 ± 0.40	0.81 ± 0.30	1.04 ± 0.41
Grade 1	7.9 ± 2.0	6.3 ± 2.5	8.4 ± 2.5	9.1 ± 3.5	0.98 ± 0.40	0.72 ± 0.18	1.02 ± 0.42
Grade 2	6.0 ± 2.6	6.1 ± 3.1	7.6 ± 3.0	8.2 ± 3.8	0.83 ± 0.45	0.79 ± 0.33	1.00 ± 0.46
Grade 3	6.4 ± 1.5	7.2 ± 2.0	8.5 ± 2.0	7.1 ± 1.1	0.91 ± 0.19	1.04 ± 0.32	1.20 ± 0.19
Control	8.3 ± 1.8	5.6 ± 2.2	8.6 ± 2.7	9.4 ± 2.2	0.91 ± 0.23	0.59 ± 0.16	0.91 ± 0.18

*Mean ± standard deviation; Q/H = Ratio of quadriceps to hamstrings strength; Add/H = Ratio of adductors to hamstrings strength; Abd/H = Ratio of abductors to hamstrings strength

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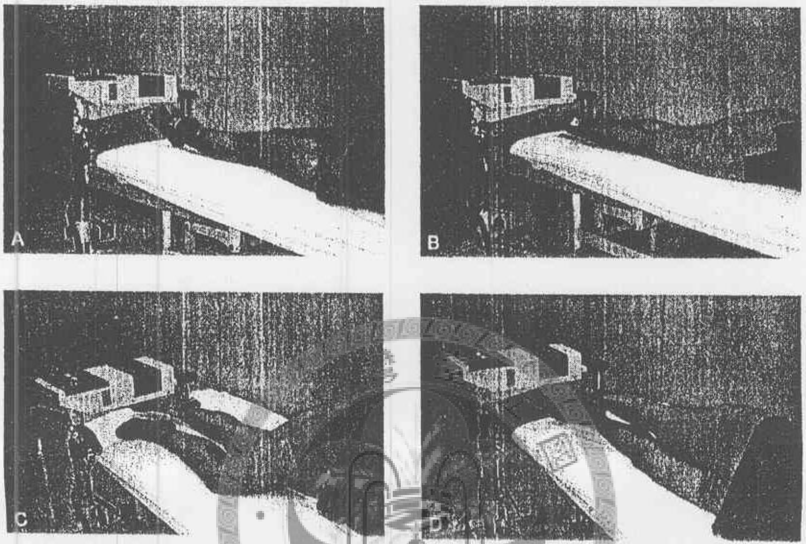

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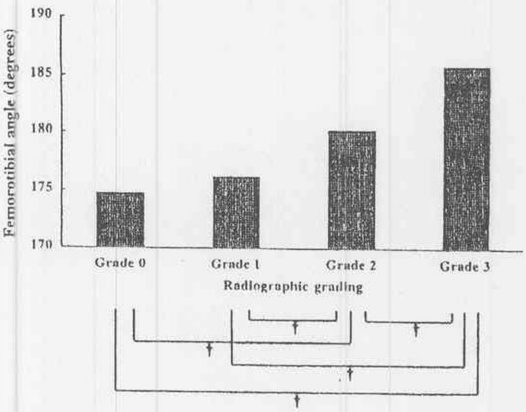

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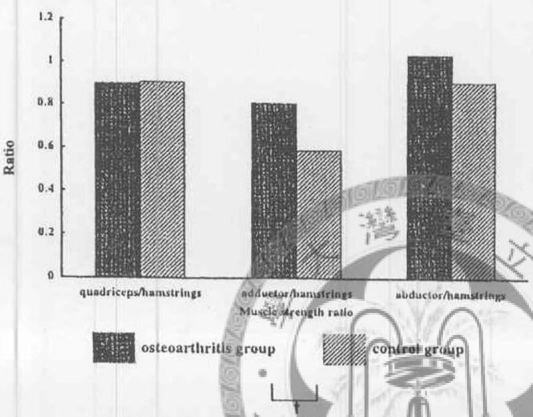

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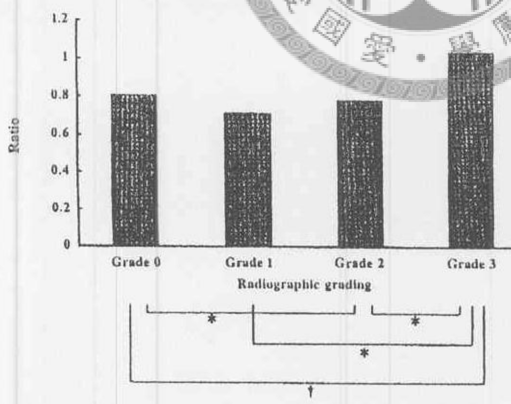

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