

The Relationship Between Body Mass Index and the Number of Sides of Carpal Tunnel Syndrome

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Abstract

The prospective study was performed in 250 patients with carpal tunnel syndrome. The mean body mass index (BMI) of patients with bilateral carpal tunnel syndrome was more than that of patients with unilateral carpal tunnel syndrome ($t = 6.84$, $p < 0.001$). There was no statistically significant difference between the mean BMI of patients with right carpal tunnel syndrome and that of patients with left carpal tunnel syndrome. In conclusion, BMI may be used to predict the number of sides of carpal tunnel syndrome.

Key word : Body Mass Index, Carpal Tunnel Syndrome, Relationship

According to Bray⁽¹⁾ and the Surgeon General⁽²⁾, the ratio of weight to height is known as body mass index (BMI), and usually defined as body weight in kilograms divided by the square of height in meters (wt/ht^2). BMI has been used to qualify obesity, and it has also been suggested as one of the risk factors for carpal tunnel syndrome (CTS)⁽³⁻⁸⁾. Based upon recommendations by Bray⁽¹⁾ and the Surgeon General⁽²⁾, BMI was divided into four classifications. A BMI equal to or less than 21 was considered slender. Medium ranged from a BMI of 21.01 to 24.99 and overweight from a BMI of 25.00 to 29.99. A BMI from 30.00 to 34.99 was termed obese, and anything equal to or greater than 35.00 was considered morbidly

obese⁽⁹⁾. The purpose of this study is to identify the relationship between BMI and the number of sides of carpal tunnel syndrome.

MATERIAL AND METHOD

From October 1996 to May 1998, 250 patients with carpal tunnel syndrome were diagnosed by the authors at the out patient clinic, Department of Orthopaedics, Ramathibodi Hospital. Electrodiagnosis was done to confirm the diagnosis in all patients. The gender, age, weight, height and sides of carpal tunnel syndrome were recorded, and BMI was calculated in all cases. Statistical analyses of the data were done by the SPSS / Window program.

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RESULTS

There were 250 patients with carpal tunnel syndrome and most of them were female (88.8%). The most common pattern of involvement was bilateral carpal tunnel syndrome which was found in 142 patients (56.8%). There were 74 patients with right carpal tunnel syndrome (29.6%) and 34 patients with left carpal tunnel syndrome (13.6%). Twenty-eight of them were male (11.2%). The mean age of the patients was 50.868 years (range, 26-82).

In Table 1, the means and variability of weight, height and BMI of the patients are shown. The mean weight was 61.094 kilograms (range, 41.50-93), and the mean height was 153.60 centimeters (range, 139-177). The mean BMI was 25.889 (range, 18.73-38.93).

In Table 2, from the Levene's test for the equality of variance, there was no statistically significant difference between the variance of BMI of patients with bilateral carpal tunnel syndrome and that of patients with unilateral involvement ($F = 1.601$, $p = 0.207$). From the pooled t -test, the mean BMI of patients with bilateral carpal tunnel syndrome was more than that of patients with unilateral carpal tunnel syndrome ($t = 6.84$, $p < 0.001$).

In Table 3, the mean BMI of patients with bilateral, right and left carpal tunnel syndrome was 27.0919, 24.3595 and 24.1974 respectively. From one-factor ANOVA (analysis of variance), the differences of the mean BMI among the three groups of patients were statistically significant ($F = 23.3170$, $P < 0.001$). The LSD (least significance difference) multiple comparison was used to evaluate the dif-

Table 1. The mean and variability of age, weight, height and BMI in patients with carpal tunnel syndrome.

Variable	Mean	Min	Variability Max	S.D.
age (year)	50.868	26	82	9.506
weight (kg)	61.094	41.50	93	8.919
height (cm)	153.60	139	177	6.60
BMI	25.889	18.73	38.93	3.469

Table 2. The pooled t -test comparing the mean BMI of patients with carpal tunnel syndrome on the right or left side and bilateral involvement.

Side	Number of patient	Mean BMI (S.D.)	t-value
bilateral	142	27.092 (3.444)	6.84***
right or left	108	24.308 (2.818)	

*** $p < 0.001$

Table 3. The LSD multiple comparisons for the differences of the mean BMI of patients with bilateral, right and left carpal tunnel syndrome.

Mean BMI	Side	Bilateral CTS patient	Right CTS patient	Left CTS patient
27.0919	bilateral	-	2.7324*	2.8945*
24.3595	right	2.7324*	-	0.1621
24.1974	left	2.8945*	0.1621	-

* $p < 0.05$

ference between two means. It was found that the mean BMI of patients with bilateral carpal tunnel syndrome was more than that of patients with right or left carpal tunnel syndrome (2.7324, 2.8945, $p < 0.05$). There was no statistically significant difference between the mean BMI of patients with right carpal tunnel syndrome and that of patients with left carpal tunnel syndrome.

DISCUSSION

Carpal tunnel syndrome is associated with many risk factors. Increased weight and BMI have been suggested as the risk factors for carpal tunnel syndrome⁽³⁻⁸⁾. The findings of this study also supported the relationship between BMI and carpal tunnel syndrome. To our knowledge, the relationship between BMI and the number of sides of carpal tunnel syndrome has never been reported.

In this study, the mean BMI of all patients was classified as overweight. The mean BMI of patients with bilateral carpal tunnel syndrome was also classified as overweight, but that of patients with one side involvement was classified as medium. From the pooled t-test, the mean BMI of patients with bilateral involvement was more than that of patients with unilateral involvement ($t = 6.84$, $p <$

0.001). The results indicate a strong by positive correlation that individuals who were classified as overweight were more likely to be diagnosed with bilateral carpal tunnel syndrome than the medium individuals. In conclusion, BMI is not only associated with carpal tunnel syndrome but also relates to the number of sides involved.

There was no statistically significant difference between the mean BMI of patients with right carpal tunnel syndrome and that of patients with left carpal tunnel syndrome. This study suggests that unilateral carpal tunnel syndrome, not specific to relates to medium BMI.

In conclusion, through statistical analyses, BMI is confirmed to be one of the risk factors for carpal tunnel syndrome. Additionally, BMI may be used to predict the number of sides of carpal tunnel syndrome. Medium BMI relates to unilateral carpal tunnel syndrome, but has no correlation with the side. Finally, overweight BMI relates to bilateral involvement.

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REFERENCES

1. Bray GA. Obesity : definition, diagnosis and disadvantages. *The Medical Journal of Australia*. 1985; 142 (suppl) : S2-S8.
 2. U.S. Department of Health and Human Services. Obesity. In : Surgeon General's report on nutrition and health. GPO 017-001-00465-1,275-309. Washington, D.C. : Public Health Service, 1989.
 3. Werner RA, Albers JW, Franzblau A, Armstrong TJ. The relationship between body mass index and the diagnosis of carpal tunnel syndrome. *Muscle & Nerve* 1994; 17: 632-6.
 4. Lam N, Thurston A. Association of obesity, gender, age and occupation with carpal tunnel syndrome. *Aust N Z J Surg* 1998; 68: 190-3.
 5. Tanaka S, Wild DK, Cameron LL, Freund E. Association of occupational and non-occupational risk factors with the prevalence of self-reported carpal tunnel syndrome in a national survey of the working population. *Am J Int Med* 1997; 32: 550-6.
 6. Nathan PA, Keniston RC, Myers LD, Meadows KD. Obesity as a risk factor for slowing of sensory conduction of the median nerve in industry. A cross-sectional and longitudinal study involving 429 workers. *J Occup Med* 1992; 34: 379-83.
 7. Stallings SP, Kasdan ML, Soergel TM, Corwin HM. A case-control study of obesity as a risk factor for carpal tunnel syndrome in population of 600 patients presenting for independent medical examination. *J Hand Surg* 1997; 22B: 211-5.
 8. de Krom MC, Kester AD, Knipschild PG, Spaans F. Risk factors for carpal tunnel syndrome. *Am J Epidemiol* 1990; 132: 1102-10.
 9. Armstrong TJ, Chaffin DB. Carpal tunnel syndrome and selected personal attributes. *J Occup Med* 1979; 21: 481-6.
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ความสัมพันธ์ระหว่างดัชนีมวลร่างกายและจำนวนข้างที่เป็นในผู้ป่วยอาการเส้นประสาท มีเดียนถูกกดทับบริเวณอุโมงค์ข้อมือ

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การศึกษาแบบไปข้างหน้าในผู้ป่วย 250 ราย ที่ได้รับการวินิจฉัยว่าเป็นอาการเส้นประสาทมีเดียนถูกกดทับบริเวณอุโมงค์ข้อมือ พบว่าค่าตัวกลางเลขคณิตของดัชนีมวลร่างกายในผู้ป่วยที่เป็นโรคดังกล่าวทั้ง 2 ข้าง มีค่ามากกว่าผู้ที่เป็นข้างเดียวอย่างมีนัยสำคัญทางสถิติ ($t = 6.84, p < 0.001$) แต่ค่าตัวกลางเลขคณิตของดัชนีมวลร่างกายในผู้ป่วยที่เป็นข้างซ้ายหรือข้างขวาเพียงข้างเดียวไม่มีความแตกต่างกันอย่างมีนัยสำคัญทางสถิติ โดยสรุป ค่าดัชนีมวลร่างกายอาจใช้ทำนายจำนวนข้างที่เป็นโรคดังกล่าวได้

คำสำคัญ : ดรรชนีมวลร่างกาย, กลุ่มอาการคาร์ปัลทันเนล, ความสัมพันธ์

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