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## Abstract

### Musculoskeletal Symptoms and Related Factors of Golf Caddies

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**Objectives:** This study evaluated the complaint rates of musculoskeletal symptoms and investigated the related factors of musculoskeletal symptoms in the caddies.

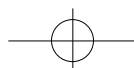
**Methods:** For 316 caddies working at 6 regular golf courses, we used the self-recording questionnaires to examine general characteristics, job stress factors, subjective musculoskeletal symptoms designed by NIOSH, working environments, and working contents.

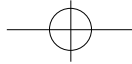
**Results:** The complaint rates of musculoskeletal symptoms according to the musculoskeletal criteria of NIOSH were 41.8% in the leg/knee/ankle/foot, 35.8% in the shoulder, 35.8% in the upper back/lower back, 28.8% in the neck, and 28.5% in the arm/wrist/fingers. Important factors affecting musculoskeletal symptoms were daily working hours during the high-demand season in all anatomical sites except the arm/wrist/fingers. Other related factors were degrees of winding and inclined in the golf courses, violent language and violence of customers, inability to regulate the velocity and work load control, heavy physical burden, instability of employment, and possibility of unemployment according to the specialty of caddies. As a results of multivariate logistic regression analysis, musculoskeletal symptoms of the neck, shoulders, back/lower back and leg/knee/ankle/foot were significantly influenced by working time over 12 hours in the high-demand season, and symptoms of the arm/wrist/fingers by low decision latitude ( $P<0.05$ ).

**Conclusions:** The complaint rates of musculoskeletal symptoms in the caddies were affected by working time over 12 hours and low decision latitude against excessively high psychological job demand.

**Key Words:** Musculoskeletal Symptoms, Golf caddies, Related factors

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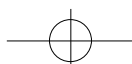




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(78.9%),

54 (17.2%),

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(3.9%)

6

13 (4.1%), 6 ~12

20 (6.3%),

(, , , , , )

12~24

34 (10.8%), 24~36

34 (10.8%), 36

208 (65.8%)

3 (1.0%),

251 (79.6%),

61 (19.4%)

(Social sup-

150

16 (5.1%), 150~200

port; 8 ),

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244 (77.7%), 200~250

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job demand; 5 ),

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(15.6%), 250

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23 (8.9%), 1 ~3

151 (58.5%), 3 ~6

67

(26.0%), 6

17 (6.6%)

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(Table 1).

(Karasek , 1998).

Karasek(1994)

(4 ~11 )

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(19.5%), 8 ~12

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173 (56.2%)

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29 (9.3%),

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7 107 (34.2%), 8

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가 8~36 ,

가

가 12~48 ,

가

206

가 24~96

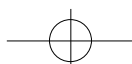
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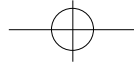
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230 (72.8%)

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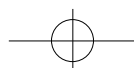


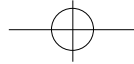


(11.1%) , 가 가 160 (50.6%)  
 151 (47.8%), 130 (41.1%) (Table 2).  
 가 가 206 가 19.7 , 39.4 ,  
 (65.2%) 가 가 27.6 (Table 3).  
 가 174 (55.1%) 가 2.  
 가 135 NIOSH  
 (42.7%), 99 (31.3%) .  
 2 가 316 142 (44.9%)

**Table 1.** General characteristics of the subjects.

| Characteristics                 | N   | %    |
|---------------------------------|-----|------|
| <b>Age(yrs)</b>                 |     |      |
| <24                             | 43  | 13.6 |
| 25 ~ 29                         | 102 | 32.3 |
| 30 ~ 34                         | 72  | 22.8 |
| 35 ~ 39                         | 71  | 22.5 |
| 40 ~ 49                         | 28  | 8.8  |
| <b>Work duration(month)</b>     |     |      |
| <6                              | 13  | 4.1  |
| 6 ~ <12                         | 20  | 6.3  |
| 12 ~ <24                        | 34  | 10.8 |
| 24 ~ <36                        | 34  | 10.8 |
| 36                              | 208 | 65.8 |
| <b>Marital status</b>           |     |      |
| Single                          | 246 | 78.9 |
| Married                         | 54  | 17.2 |
| Divorced                        | 12  | 3.9  |
| <b>Education level</b>          |     |      |
| Middle school                   | 3   | 1.0  |
| High school                     | 251 | 79.6 |
| College                         | 61  | 19.4 |
| <b>Income(10,000 won/month)</b> |     |      |
| < 150                           | 16  | 5.1  |
| 150 ~ <200                      | 244 | 77.7 |
| 200 ~ <250                      | 49  | 15.6 |
| 250                             | 5   | 1.6  |
| <b>Housework hours</b>          |     |      |
| < 1                             | 23  | 8.9  |
| 1 ~ <3                          | 151 | 58.5 |
| 3 ~ <6                          | 67  | 26.0 |
| 6                               | 17  | 6.6  |



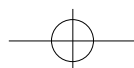


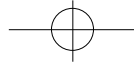
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. / / / 가 113  
/ 132 (41.8%) 가 (35.8%), 91 (28.8%), / / 가 90

**Table 2.** Occupational characteristics of the subjects.

| Characteristics                      | N   | %    |
|--------------------------------------|-----|------|
| Working hours(high demand season)    |     |      |
| < 8                                  | 60  | 19.5 |
| 8 ~ <12                              | 75  | 24.3 |
| 12                                   | 173 | 56.2 |
| Working hours(low demand season)     |     |      |
| < 8                                  | 303 | 99.0 |
| 8 ~ <12                              | 4   | 1.0  |
| Frequency of rounding per week       |     |      |
| 6                                    | 29  | 9.3  |
| 7                                    | 107 | 34.2 |
| 8                                    | 177 | 56.5 |
| Winding & inclined in golf course    |     |      |
| Yes                                  | 206 | 65.2 |
| No                                   | 110 | 34.8 |
| Conflict(violent language, violence) |     |      |
| Yes                                  | 230 | 72.8 |
| No                                   | 86  | 27.2 |
| Income satisfaction                  |     |      |
| Satisfaction                         | 35  | 11.1 |
| Moderate                             | 151 | 47.8 |
| Dissatisfaction                      | 130 | 41.1 |
| Velocity & work-load control         |     |      |
| Uncontrollable                       | 206 | 65.2 |
| Moderate                             | 87  | 27.5 |
| Controllable                         | 23  | 7.3  |
| Employment stability                 |     |      |
| Severely unstable                    | 174 | 55.1 |
| Unstable                             | 124 | 39.2 |
| Stable                               | 16  | 5.1  |
| Very stable                          | 2   | 0.6  |
| Physical burden                      |     |      |
| None                                 | 5   | 1.6  |
| Light                                | 77  | 24.4 |
| Heavy                                | 99  | 31.3 |
| Too heavy                            | 135 | 42.7 |
| Unemployment possibility             |     |      |
| None                                 | 59  | 18.7 |
| Moderate                             | 97  | 30.7 |
| High                                 | 160 | 50.6 |





(28.5%) (Table 4). / / 1 ,

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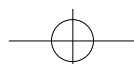
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**Table 3.** Mean score of job stress.

| Variables                | Mean ± SD (Range)  |
|--------------------------|--------------------|
| Social Support           | 19.7 ± 3.3 ( 8-32) |
| Supervisor support       | 7.5 ± 3.2 ( 4-16)  |
| Coworker support         | 12.2 ± 1.8 ( 4-16) |
| Psychological job demand | 39.4 ± 6.8 (26-48) |
| Decision latitude        | 27.6 ± 5.3 (18-44) |
| Skill discretion         | 16.6 ± 2.1 (10-22) |
| Decision authority       | 11.0 ± 5.0 ( 6-23) |

**Table 4.** Complaint rate of musculoskeletal symptoms.

| Site                      | N   | Complaint rate |      |
|---------------------------|-----|----------------|------|
|                           |     |                | %    |
| Neck                      | 91  |                | 28.8 |
| Shoulder                  | 113 |                | 35.8 |
| Arm/wrist/finger          | 90  |                | 28.5 |
| Upper back/lower back     | 113 |                | 35.8 |
| Leg/knee/ankle/foot       | 132 |                | 41.8 |
| Total (At least one site) | 142 |                | 44.9 |

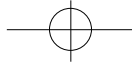


**Table 5.** Complaint rate in musculoskeletal symptoms by type of work

| Variables                              | Neck      |          | Shoulder  |          | Arm/wrist<br>/finger |          | Upper back/<br>lower back |          | Leg/knee/ankle<br>foot |          |
|--|-----------|----------|-----------|----------|----------------------|----------|---------------------------|----------|------------------------|----------|
|  | N(%)      | $\chi^2$ | N(%)      | $\chi^2$ | N(%)                 | $\chi^2$ | N(%)                      | $\chi^2$ | N(%)                   | $\chi^2$ |
| Working hours(high demand season)      |           |          |           |          |                      |          |                           |          |                        |          |
| < 8                                    | 6 ( 6.6)  | 0.001    | 16 (14.2) | 0.004    | 14 (15.6)            | 0.102    | 11 ( 9.7)                 | 0.031    | 23 (17.4)              | 0.031    |
| 8 ~ 12                                 | 12 (13.2) |          | 17 (15.0) |          | 17 (18.9)            |          | 21 (18.6)                 |          | 24 (18.2)              |          |
| > 12                                   | 73 (80.2) |          | 80 (70.8) |          | 59 (65.5)            |          | 81 (71.7)                 |          | 85 (64.4)              |          |
| Frequency of rounding per week         |           |          |           |          |                      |          |                           |          |                        |          |
| 6                                      | 6 ( 6.6)  | 0.230    | 10 ( 8.6) | 0.815    | 7 ( 7.8)             | 0.669    | 8 ( 7.1)                  | 0.376    | 12 ( 9.1)              | 0.858    |
| 7                                      | 28 (30.8) |          | 40 (35.4) |          | 32 (35.5)            |          | 38 (33.6)                 |          | 46 (34.8)              |          |
| 8                                      | 57 (62.6) |          | 63 (55.8) |          | 51 (56.7)            |          | 67 (59.3)                 |          | 74 (56.1)              |          |
| Winding & inclined in golf course      |           |          |           |          |                      |          |                           |          |                        |          |
| Yes                                    | 75 (82.4) | 0.001    | 87 (77.0) | 0.001    | 66 (73.3)            | 0.055    | 88 (77.9)                 | 0.004    | 95 (72.0)              | 0.032    |
| No                                     | 16 (17.6) |          | 26 (23.0) |          | 24 (26.7)            |          | 25 (22.1)                 |          | 37 (28.0)              |          |
| Conflition(violent language, violence) |           |          |           |          |                      |          |                           |          |                        |          |
| Yes                                    | 78 (85.7) | 0.001    | 92 (81.4) | 0.010    | 70 (77.8)            | 0.208    | 93 (82.3)                 | 0.004    | 103 (78.0)             | 0.076    |
| No                                     | 13 (14.3) |          | 21 (18.6) |          | 20 (22.2)            |          | 20 (17.7)                 |          | 29 (22.0)              |          |
| Income satisfaction                    |           |          |           |          |                      |          |                           |          |                        |          |
| Satisfaction                           | 3 ( 3.3)  | 0.001    | 10 ( 8.8) | 0.119    | 8 ( 8.9)             | 0.127    | 11 ( 9.7)                 | 0.768    | 12 ( 9.1)              | 0.631    |
| Moderate                               | 39 (42.9) |          | 48 (42.5) |          | 37 (41.1)            |          | 53 (46.9)                 |          | 64 (48.5)              |          |
| Dissatisfaction                        | 49 (53.8) |          | 55 (48.7) |          | 45 (50.0)            |          | 49 (43.4)                 |          | 56 (42.4)              |          |
| Velocity & work load control           |           |          |           |          |                      |          |                           |          |                        |          |
| Uncontrollable                         | 73 (80.2) | 0.001    | 87 (77.0) | 0.002    | 68 (75.6)            | 0.020    | 85 (75.2)                 | 0.003    | 93 (70.4)              | 0.148    |
| Moderate                               | 16 (17.6) |          | 23 (20.4) |          | 20 (22.2)            |          | 26 (23.0)                 |          | 33 (25.0)              |          |
| Controllable                           | 2 ( 2.2)  |          | 3 ( 2.6)  |          | 2 ( 2.2)             |          | 2 ( 1.8)                  |          | 6 ( 4.6)               |          |
| Physical burden                        |           |          |           |          |                      |          |                           |          |                        |          |
| None                                   | 0 ( 0.0)  | 0.003    | 0 ( 0.0)  | 0.020    | 0 ( 0.0)             | 0.011    | 1 ( 0.9)                  | 0.037    | 1 ( 0.8)               | 0.226    |
| Light                                  | 11 (12.1) |          | 20 (17.7) |          | 12 (13.3)            |          | 19 (16.8)                 |          | 26 (19.7)              |          |
| Heavy                                  | 31 (34.1) |          | 34 (30.1) |          | 33 (36.7)            |          | 34 (30.1)                 |          | 42 (31.8)              |          |
| Too heavy                              | 49 (53.8) |          | 59 (52.2) |          | 45 (50.0)            |          | 59 (52.2)                 |          | 63 (47.7)              |          |
| Employment stability                   |           |          |           |          |                      |          |                           |          |                        |          |
| Severely unstable                      | 63 (69.2) | 0.019    | 74 (65.5) | 0.015    | 58 (64.4)            | 0.075    | 76 (67.3)                 | 0.006    | 81 (61.4)              | 0.107    |
| Unstable                               | 24 (26.4) |          | 32 (28.3) |          | 26 (28.9)            |          | 31 (27.4)                 |          | 43 (32.6)              |          |
| Stable                                 | 4 (4.4)   |          | 7 ( 6.2)  |          | 6 ( 6.7)             |          | 6 ( 5.3)                  |          | 8 ( 6.1)               |          |
| Unemployment possibility               |           |          |           |          |                      |          |                           |          |                        |          |
| None                                   | 6 (6.6)   | 0.001    | 11(9.7)   | 0.003    | 13 (14.4)            | 0.126    | 15 (13.3)                 | 0.005    | 20 (15.2)              | 0.140    |
| Moderate                               | 20 (22.0) |          | 27(23.9)  |          | 23 (25.6)            |          | 26 (23.0)                 |          | 35 (26.5)              |          |
| High                                   | 65 (71.4) |          | 75(66.4)  |          | 54 (60.0)            |          | 72 (63.7)                 |          | 77 (58.3)              |          |







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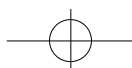
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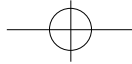
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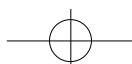
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