The Correlation of Hip Joint Passive Range of Motion with Lower Limbs Injuries in Professional Soccer Players

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Abstract

Introduction: Soccer is a popular sport with a high injury rate. Lower limb injuries are accounted for 85% of injuries in professional Soccer player. It is important to identify the predisposing factors in professional Soccer players for screening players at an increased risk of injury. It is unclear whether to assume limited hip range of motion (ROM) as one of these factors this study aimed to evaluate the association between hip passive ROM and lower limb injury in Iranian professional Soccer players.

Design: This prospective cohort study was conducted on 266 male professional Soccer players (with a mean age of 24.91 ± 4.38 years) playing in the Iran Soccer Premium League during the 2017-2018 and 2018-2019 season. Baseline hip joint passive ROM was evaluated in all subjects. All athletes were followed for two consecutive seasons and their lower limb injuries causing at least an absent from a competitive match was reported. The association between hip ROM and the incidence of lower limb injuries was analyzed.

Results: The most common lower limb injuries were ankle and foot injuries (12.4%), groin pain (11.5%) and muscle strain (10.9%), respectively. Restricted hip internal rotation (IR) was associated with a higher incidence of groin pain, ACL injury and knee injury. A significant correlation was observed between decreased hip external rotation (ER) with muscle strain and knee injuries. The higher knee injury was also associated with reduced hip abduction. There was no association between ankle and foot injuries and hip passive ROM.

Conclusions: This study showed that hip passive ROM could be used to identify Soccer players at a higher risk of lower limb injuries. Hip rotational ROM and abduction limitation were significantly associated with the incidence of several common Soccer injuries, including groin pain, muscle strain and ACL/knee injuries and precedes their development and could be used as a screening tool for professional male soccer players.

Full Text

Due to technical limitations, full-text HTML conversion of this manuscript could not be completed. However, the manuscript can be downloaded and accessed as a PDF.

Tables
Table 1- Hip joint passive range of motion in participants

| Movement                  | Right side | Left side |
|---------------------------|------------|-----------|
| Flexion, n (%)            |            |           |
| Normal                    | 37 (13.9)  | 67 (25.2) |
| Decreased                 | 229 (86.1) | 199 (74.8)|
| Extension, n (%)          |            |           |
| Normal                    | 21 (7.9)   | 11 (4.1)  |
| Decreased                 | 245 (92.1) | 255 (95.9)|
| Abduction, n (%)          |            |           |
| Normal                    | 266 (100)  | 253 (95.1)|
| Decreased                 | 0 (0)      | 13 (4.9)  |
| Adduction, n (%)          |            |           |
| Normal                    | 25 (9.4)   | 98 (36.8) |
| Decreased                 | 241 (90.6) | 168 (63.2)|
| Internal rotation, n (%)  |            |           |
| Normal                    | 184 (69.2) | 158 (59.4)|
| Decreased                 | 82 (30.8)  | 108 (40.6)|
| External rotation, n (%)  |            |           |
| Normal                    | 124 (46.6) | 140 (52.6)|
| Decreased                 | 142 (53.4) | 126 (47.4)|

Table 2- Frequency of Lower Limb Injuries in Iranian Premier League Football Players

| Type of injury           | Right side | Left side | Total  |
|--------------------------|------------|-----------|--------|
| Groin pain, n (%)        | 33 (12.4)  | 28 (10.5) | 61 (11.5)|
| Muscle strain, n (%)     | 36 (13.5)  | 22 (8.3)  | 58 (10.9)|
| ACL injury, n (%)        | 7 (2.6)    | 7 (2.6)   | 14 (2.6) |
| Knee injury, n (%)       | 22 (8.3)   | 18 (6.8)  | 40 (7.5) |
| Ankle and foot injury, n (%)| 33 (12.4) | 33 (12.4) | 66 (12.4)|
Table 3: The comparison between Hip ROM and occurrence of groin pain

| Hip ROM         | Right side          | Left side           |   |
|-----------------|---------------------|---------------------|---|
|                 | Non-injured | Injured | P-value | Non-injured | Injured | P-value |
| **Flexion, n (%)** |          |        |         |            |         |         |
| Normal          | 33 (89.2) | 4 (10.8) | .51     | 59 (88.1) | 8 (11.9) | .41     |
| Decreased       | 200 (87.3) | 29 (12.7) |         | 179 (89.9) | 20 (10.1) | .41     |
| **Extension, n (%)** |          |        |         |            |         |         |
| Normal          | 17 (81) | 4 (19) | .25     | 9 (81.8) | 2 (18.2) | .32     |
| Decreased       | 216 (88.2) | 29 (11.8) |         | 229 (89.8) | 26 (10.2) | .32     |
| **Abduction, n (%)** |          |        |         |            |         |         |
| Normal          | 233 (87.6) | 33 (12.4) | -       | 227 (89.7) | 26 (10.3) | .41     |
| Decreased       | 0 (0) | 0 (0) | -       | 11 (84.6) | 2 (15.4) | .41     |
| **Adduction, n (%)** |          |        |         |            |         |         |
| Normal          | 22 (88) | 3 (12) | .62     | 88 (89.8) | 10 (10.2) | .53     |
| Decreased       | 211 (87.6) | 30 (12.4) |         | 150 (89.3) | 18 (10.7) | .53     |
| **Internal rotation, n (%)** |          |        |         |            |         |         |
| Normal          | 166 (90.2) | 18 (9.8) | .04     | 144 (91.1) | 14 (8.9) | .19     |
| Decreased       | 67 (81.7) | 15 (18.3) |         | 94 (87) | 14 (13) | .19     |
| **External rotation, n (%)** |          |        |         |            |         |         |
| Normal          | 111 (89.5) | 13 (10.5) | .24     | 126 (90) | 14 (10) | .46     |
| Decreased       | 122 (85.9) | 20 (14.1) |         | 112 (88.9) | 14 (11.1) | .46     |
Table 4- The comparison between Hip ROM and occurrence of muscle strain

| Hip ROM       | Right side | | | Left side | | |
|---------------|------------|---------------|--------------|------------------|------------------|
|               |            | Non-injured   | Injured      | Non-injured   | Injured         |
|               |            |               | P-value      |               | P-value         |
| Flexion, n (%)|            |               |              |               |                 |
| Normal        | 31 (83.8)  | 6 (16.2)      | .38          | 64 (95.5)     | 3 (4.5)         | .14 |
| Decreased     | 199 (86.9)| 30 (13.1)     |              | 180 (90.5)    | 19 (9.5)        |     |
| Extension, n (%)|          |               |              |               |                 |
| Normal        | 18 (85.7)  | 3 (14.3)      | .56          | 11 (100)      | 0 (0)           | .38 |
| Decreased     | 212 (86.5)| 33 (13.5)     |              | 233 (91.4)    | 22 (8.6)        |     |
| Abduction, n (%)|          |               |              |               |                 |
| Normal        | 230 (86.5)| 36 (13.5)     |              | 232 (91.7)    | 21 (8.3)        | .71 |
| Decreased     | 0 (0)      | 0 (0)         | -            | 12 (92.3)     | 1 (7.7)         |     |
| Adduction, n (%)|          |               |              |               |                 |
| Normal        | 22 (88)    | 3 (12)        | .55          | 85 (86.7)     | 13 (13.3)       | .02 |
| Decreased     | 208 (86.3)| 33 (13.7)     |              | 159 (94.6)    | 9 (5.4)         |     |
| Internal rotation, n (%)| | | P-value | | | |
| Normal        | 159 (86.4)| 25 (13.6)     | .57          | 146 (92.4)    | 12 (7.6)        | .39 |
| Decreased     | 71 (86.6) | 11 (13.4)     |              | 98 (90.7)     | 10 (9.3)        |     |
| External rotation, n (%)| | | P-value | | | |
| Normal        | 112 (90.3)| 12 (9.7)      | .05          | 129 (92.1)    | 11 (7.9)        | .48 |
| Decreased     | 118 (83.1)| 24 (16.9)     |              | 115 (91.3)    | 11 (8.7)        |     |
### Table 5: The comparison between Hip ROM and occurrence of ACL injury

| Hip ROM      | Right side |       |       |      | Left side |       |       |      |
|--------------|------------|-------|-------|------|-----------|-------|-------|------|
|              |            | Non-injured | Injured | P-value | Non-injured | Injured | P-value |      |
| Flexion, n (%) |            |       |       |      |            |       |       |      |
| Normal       | 37 (100)   | 0 (0) |       | .34  | 67 (100)   | 0 (0)  |       | .12  |
| Decreased    | 222 (96.9) | 7 (3.1)|       | | 192 (96.5) | 7 (3.5) |       |      |
| Extension, n (%) |            |       |       |      |            |       |       |      |
| Normal       | 21 (100)   | 0 (0) |       | .55  | 11 (100)   | 0 (0)  |       | .74  |
| Decreased    | 238 (97.1) | 7 (2.9)|       | | 248 (97.3) | 7 (2.7) |       |      |
| Abduction, n (%) |            |       |       |      |            |       |       |      |
| Normal       | 259 (97.4) | 7 (2.6)|       | -    | 248 (98)   | 5 (2)  |       | .04  |
| Decreased    | 0 (0)      | 0 (0) |       |      | 11 (84.6)  | 2 (15.4)|       |      |
| Adduction, n (%) |            |       |       |      |            |       |       |      |
| Normal       | 25 (100)   | 0 (0) |       | .49  | 95 (96.9)  | 3 (3.1)|       | .51  |
| Decreased    | 234 (97.1) | 7 (2.9)|       | | 164 (97.6) | 4 (2.4)|       |      |
| Internal rotation, n (%) |            |       |       |      |            |       |       |      |
| Normal       | 177 (96.2) | 7 (3.8)|       | .07  | 158 (100)  | 0 (0)  |       | .002 |
| Decreased    | 82 (100)   | 0 (0) |       |      | 101 (93.5) | 7 (6.5)|       |      |
| External rotation, n (%) |            |       |       |      |            |       |       |      |
| Normal       | 119 (96)   | 5 (4) |       | .17  | 138 (98.6) | 2 (1.4)|       | .18  |
| Decreased    | 140 (98.6) | 2 (1.4)|       |       | 121 (96)   | 5 (4)  |       |      |
| Hip ROM        | Right side | Left side |   |
|---------------|------------|-----------|---|
|               | Non-injured| Injured   | P-value | Non-injured| Injured| P-value|
| **Flexion, n (%)** |            |           | |            |           |     |
| Normal        | 36 (97.3)  | 1 (2.7)   | .15     | 64 (95.5)  | 3 (4.5)  | .29   |
| Decreased     | 208 (90.8)| 21 (9.2)  | .65     | 184 (92.5) | 15 (7.5) | .29   |
| **Extension, n (%)** |          |           | |          |           |     |
| Normal        | 20 (95.2)  | 1 (4.8)   | .46     | 11 (100)   | 0 (0)    | .45   |
| Decreased     | 224 (91.4)| 21 (8.6)  | .46     | 237 (92.9)| 18 (7.1) | .45   |
| **Abduction, n (%)** |         |           | |          |           |     |
| Normal        | 244 (91.7)| 22 (8.3)  | .46     | 238 (94.1)| 15 (5.9)| .04   |
| Decreased     | 0 (0)      | 0 (0)     | -       | 10 (76.9) | 3 (23.1)| .04   |
| **Adduction, n (%)** |       |           | |          |           |     |
| Normal        | 22 (88)    | 3 (12)    | .34     | 90 (91.8) | 8 (8.2) | .35   |
| Decreased     | 222 (92.1)| 19 (7.9)  | .34     | 158 (94)  | 10 (6)  | .35   |
| **Internal rotation, n (%)** |       |           | |          |           |     |
| Normal        | 167 (90.8)| 17 (9.2)  | .27     | 153 (96.8)| 5 (3.2) | .005  |
| Decreased     | 77 (93.9) | 5 (6.1)   | .27     | 95 (88)   | 13 (12) | .005  |
| **External rotation, n (%)** |       |           | |          |           |     |
| Normal        | 115 (92.7)| 9 (7.3)   | .37     | 136 (97.1)| 4 (2.9) | .007  |
| Decreased     | 129 (90.8)| 13 (9.2)  | .37     | 112 (88.9)| 14 (11.1)| .007  |
Table 7 - The comparison between Hip ROM and occurrence of ankle and foot injury

| Hip ROM       | Right side |       |       |      | Left side |       |       |      |
|---------------|------------|-------|-------|------|-----------|-------|-------|------|
|               | Non-injured | Injured | P-value | Non-injured | Injured | P-value |      |
| Flexion, n (%)| Normal     | 32 (86.5) | 5 (13.5) | .49 | 60 (89.6) | 7 (10.4) | .37 |
|               | Decreased  | 201 (87.8) | 28 (12.2) | | 173 (86.9) | 26 (13.1) | |
| Extension, n (%)| Normal    | 18 (85.7) | 3 (14.3) | .49 | 10 (90.9) | 1 (9.1) | .59 |
|               | Decreased  | 215 (87.8) | 30 (12.2) | | 223 (87.5) | 32 (12.5) | |
| Abduction, n (%)| Normal    | 233 (87.6) | 33 (12.4) | | 221 (87.4) | 32 (12.6) | |
|               | Decreased  | - | - | | 12 (92.3) | 1 (7.7) | .51 |
| Adduction, n (%)| Normal    | 20 (80) | 5 (20) | .18 | 83 (84.7) | 15 (15.3) | .18 |
|               | Decreased  | 213 (88.4) | 28 (11.6) | | 150 (89.3) | 18 (10.7) | |
| Internal rotation, n (%)| Normal  | 165 (89.7) | 19 (10.3) | .09 | 140 (88.6) | 18 (11.4) | .33 |
|               | Decreased  | 68 (82.9) | 14 (17.1) | | 93 (86.1) | 15 (13.9) | |
| External rotation, n (%)| Normal  | 105 (84.7) | 19 (15.3) | .12 | 120 (85.7) | 20 (14.3) | .21 |
|               | Decreased  | 128 (90.1) | 14 (9.9) | | 133 (89.7) | 13 (10.3) | |

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