順天堂大学大学院スポーツ健康科学研究科 和文抄録
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投手における肩甲骨位置と肩関節周囲筋の筋硬度の関係

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【目的】
本研究の目的は、野球投手における肩甲骨位置と肩関節周囲筋の筋硬度との関連性を明らかにすることとした。

【方法】
大学硬式野球部に所属する投手15名(年齢20.5±0.5歳、身長175.1±5.7cm、体重73.4±5.2kg)を対象とした。肩甲骨位置および筋硬度(Strain ratio:SR;僧帽筋上部・下部、菱形筋、棘下筋、小円筋)、肩関節内旋・外旋筋筋力、肩関節可動域(2nd内・外旋、水平屈曲・伸展)を週1回、計5回測定し、各週の週ごとの投球数も記録した。肩甲骨位置は、上角・下角・肩甲棘と肩甲骨の内側縁の交点・肩峰の4点について、第7頸椎棘突起(C7)を基準とした高さと、C7と第10胸椎棘突起を結ぶ線への直線との最短距離で評価した。

【結果】
肩甲骨位置とSRの関係において、肩峰-距離と菱形筋のSR(r=-0.311)、肩甲棘と肩甲骨の内側縁の交点-高さと小円筋のSR(r=-0.266)、肩峰-高さと僧帽筋上部のSR(r=-0.311)、下角-高さと僧帽筋下部(r=-0.339)および小円筋のSR(r=-0.299)の間に弱い負の相関がみられた (p<0.05)。さらに、週間投球数が150球以上であった週の前後で、上角-高さは上昇し(前:5.1 ± 1.6cm、後:4.5 ± 1.5cm、p<0.05)、上角-距離は減少する傾向がみられた(前:15.7 ± 2.0cm、後:15.2 ± 1.8cm、p＝0.095)。また、僧帽筋上部のSRは低下し(前:3.8 ± 1.6、後:3.4 ± 1.2、p<0.05)、小円筋のSRも低下する傾向がみられた(前:3.7 ± 1.6、後:3.2 ± 0.9、p＝0.068)。

【結論】
肩甲骨位置と僧帽筋上部および下部、菱形筋、小円筋の筋硬度の変化に関係があることが示された。また、投球により肩甲骨の上角が内側および上方に変位し、僧帽筋上部は硬くなる傾向があることが明らかになった。

Juntendo University, Graduate School of Health and Sports Science 英文抄録（Abstract）
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Relation between scapular position and muscle hardness of the shoulder muscles of pitchers

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[Purpose]
This study was designed to elucidate the relation between the scapular position and muscle hardness of shoulder muscles in baseball pitchers.

[Methods]
This study examined 15 participating college baseball pitchers (age, 20.5 ± 0.5 years; height, 175.1 ± 5.7 cm; weight, 73.4 ± 5.2 kg). Their scapular position, muscle hardness (strain ratio, SR; upper and lower trapezius, rhomboids, infraspinatus, and teres minor muscle), the shoulder internal and external rotational strength, and shoulder range of motion were measured once a week (five times in all). Their weekly numbers of pitches were also recorded. The scapular position was assessed according to the following distances: spine and the height from the seventh cervical vertebra in the scapula superior angle and scapula inferior angle, the intersection of the spine of the scapula and the medial edge of the scapula, and the spine–acromion distance.

[Results]
For the relation between scapular position and SR, weak negative correlation was found between the acromion distance and rhomboids ($r=-0.311$), intersection of the scapular spine and the medial border of the scapula height and teres minor ($r=-0.266$), the acromion height and upper trapezius ($r=-0.311$), inferior angle height and SR of the lower trapezius ($r=-0.339$) and teres minor ($r=-0.299$) ($p<0.05$). Furthermore, a trend toward an increase in the superior angle height was found (pre, 5.1 ± 1.6 cm; post, 4.5 ± 1.5 cm, $p<0.05$) along with a decrease in the superior angle distance (pre, 15.7 ± 2.0 cm; post, 15.2 ± 1.8 cm, $p=0.095$) before and after weeks when the weekly pitch count was greater than 150 pitches. The SR of the upper trapezius tended to decrease (pre, 3.8 ± 1.6; post, 3.4 ± 1.2, $p<0.05$). The SR of the teres minor also decreased (pre, 3.7 ± 1.6; post, 3.2 ± 0.9, $p=0.068$).

[Conclusion]
These results demonstrated a relation between the scapular position and changes in the muscle hardness of the upper and lower trapezius,rhomboids, and the teres minor. Results also showed that pitching tended to displace the superior angle of the scapula, both medial and superior. The upper trapezius tended to harden.