Measurement of external ischial tuberosity width for young Taiwanese subjects
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Introduction:
People lead a sedentary lifestyle throughout most of the day because of work and living activities. In addition to the lumbar spine, a crucial factor for designing seats (cushions) is buttock-seat (cushion) contact. Specifically, seated pressure is the most frequently studied aspect (Dunk and Callaghan, 2005). Chairs with different functions may result in various types of seated pressure distribution, which is mainly influenced by the value of seated pressure between the ischial tuberosities (ITs) of the human pelvis and the seat surface. An understanding of external ischial tuberosity width (EITW), which represents the width of the ITs covered in fat pads, has practical contributions to the design of seats and cushions.

Method:
In this study, we measured the EITW of both young Taiwanese men and women and investigated sex differences in EITW values. We recruited 15 male and 15 female subjects and their EITWs were measured using an impression method which was referring to a previous study of Potter and his co-workers (2007). Three repetitions were performed for each subject. To determine whether anthropometric values are predictive of EITW, a multiple stepwise regression analysis was used for developing the EITW prediction models with the anthropometric data set as dependent variables.

Results:
This study adopted the intra-class correlation coefficient to examine the male and female EITW values obtained using the impression method. The results showed that the reliability of the three measurements of the participants, either male or female, was higher than 0.9, which indicated satisfactory internal consistency.

The results showed that the EITW values obtained using the impression measurement method were similar to those in the previous studies (Sauer et al., 2007), and that sex differences existed in the measurement (Table 1). In the analysis, the women had greater EITW values than the men did, which was probably caused by the distinct characteristics of male and female muscles and adipose tissues. This study therefore proposed that 12.0 cm and 13.5 cm can be respectively referred to as the design parameters for male and female EITWs in Taiwan. According to the results of multiple stepwise regression analysis, hip circumference is an effective predictor for EITW values, with percentages of explained variances of 68% and 65% for men and women, respectively. The predictive models established in this study are a convenient and simple method for acquiring EITW values.
Discussion:
Generally, during sitting, the ITs do not have direct contact with seat surface because they are separated by the muscle and adipose tissues that cover the pelvis. Compared with other body parts, the posterior and lower parts of the buttocks are thick and dense, forming fat pads capable of bearing the pressure generated during sitting. However, different sitting postures (e.g., different thigh-torso angles) may result in varying relative positions between fat pads and ITs, which therefore influence the values of sitting pressure.

Keywords: External ischial tuberosity width (EITW), impression method, seat design

References:

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<tr>
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<th>Mean (SD) EITW, unit in cm</th>
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<tbody>
<tr>
<td></td>
<td>This study</td>
</tr>
<tr>
<td>Men</td>
<td>n = 15, 11.90 (1.18)</td>
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<tr>
<td>Women</td>
<td>n = 15, 13.63 (0.95)</td>
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