

Designing a Crowbar for Women: An Ergonomic Approach

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Abstract : Crowbars are used for the gardening purpose. The same tools are used by both male and female gardeners. The existing crowbars are suitable for the female gardeners. The present study was aimed to design a crowbar, which was required to use by the women for the gardening purpose, from the viewpoints of ergonomics. The study was carried out on 50 women in different villages of Howrah districts in West Bengal state. Different models of existing crowbars which were commonly used by the women were collected and evaluated by examining their shape and size. The problems of using existing crowbar were assessed by direct observation during its operation. The musculoskeletal disorder of the subjects for using the crowbar was evaluated by modified Nordic questionnaire method. The anthropometric dimensions, especially hand dimension, of the subjects were taken in standardized static conditions. Considering the problems of using the existing crowbars some design concepts were developed and accordingly three prototypes models (P1, P2, P3) of crowbar were prepared for designing of a modified crowbar for women. Psychophysical analysis of those prototypes was made by paired comparison tests. In the above test subjective preference for different characteristics of the crowbar, e.g., length, weight, length and breadth of the blade, handle diameter, position of the handle, were determined. From the results of the paired comparison test and percentile values of hand dimensions, a modified design of crowbar was suggested. The prototype model P1 possessed more preferred characteristics of the tool than that of other prototype models. In the final design, the weight of the tool and length of the blade was reduced from that of the existing crowbar. Other dimensions were also changed. Two handles were suggested in the redesigned tool for better gripping and operation. The modified crowbar was evaluated by studying the body joint angles, viz., wrist, shoulder and elbow, for assessing the suitability of the design. It was concluded that the redesigned crowbar was suitable for women's use.

Keywords : body dimension, crowbar, ergo-design, women, hand anthropometry

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