This study serves to identify the relationship between backpack weight, carrying frequency and duration, method, and perceived discomfort levels among university students. A survey (n=86), containing 14 questions, was sent out through social media targeting university students, who carry backpacks at least once a week. The average estimated weight of backpacks was 13.4 pounds, and on the average, male students carried 7% of their body weight, and female students carried 9% of their body weight. Backpack weight inversely varied with age. On a 0-5 point scale, the level of muscle tightness, ache, pain or discomfort (MTAPD) during bag carriage was 3 or higher for 46% of the cases. Location of MTAPD was reported in shoulder, lower back, neck, middle back, and upper back region 48%, 18%, 16%, 10% and 8% of times, respectively. Students with backpack positioned on the upper back were least likely to experience MTAPD, but this position reported highest average MTAPD level of 2.9, as compared to positions on lower back, and carrying one sided, 2.5 and 2.6, respectively. Position of backpack may have significant effect on comfort and should be further investigated. MTAPD during the bag carriage was reported by 77% of female students as opposed to 47% male students. Higher percent of female students complained long term MTAPD that lasted few hours (46%), few days (12%), interfered with their ability to pursue academic activity (46%), and interfered with their daily routines (35%). The corresponding figures for males were significantly smaller, 23%, 7%, 45% and 35% respectively. These results indicate female university students are more vulnerable, and guideline related load limit should be developed based on female students’ ability to carry backpack comfortably.

Female participants were 1.7 times more likely to experience discomfort from backpack carriage. This can partially attributed to higher muscle mass in the males over the females, but may also have been influenced by the cultural expectations from society.

A moment-arm reduction, in terms of placement of the backpack on the spine, will result in overall less pain through carrying time. Designers should consider using cushioning, designed specifically to fill in the gaps between the bag and the body, as this may aid in decreasing the impact caused by a backpack repeatedly hitting an individual’s spine during use.

The survey was distributed through email and social media. The answers were collected through a form created on Google Docs. Many of the questions developed for the survey were based on musculoskeletal discomfort survey from Cornell University’s Ergonomics Web http://ergo.human.cornell.edu/. In addition, many demographic questions were asked as well. Participants were asked to complete the survey if only they used a backpack on a weekly basis.

Method

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