BACKGROUND: Low back pain (LBP) is one of the most common musculoskeletal issues in people over the age of 65. In fact, 17.3% of all visits to physicians for LBP involve individuals over the age of 65. As evidence of the societal impact of LBP in older adults, between 1991 and 2002, Medicare data indicates a 132% increase in LBP patients and a 387% increase in related charges for LBP. Despite the fact that LBP is a common problem for older adults and is associated with poor outcomes in this vulnerable age group, little research has focused on LBP in aging populations. With minimal research available, clinicians are left without clear evidence-based guidance as to how they should evaluate or manage older adults with LBP.

Although all older adults are at some risk for mobility limitations it is becoming clear that those with significant LBP may be at a greater risk for functional decline. Several large epidemiologic studies have demonstrated that LBP is independently associated with functional decline, particularly walking speed. Gait characteristics such as gait speed, stride length, step width, double limb support time, as well as variability in each of these individual parameters have been identified as strong predictors of mobility disability in older adults. We, therefore, believe that it is important to understand the potential impact of LBP on gait among older adults. The purpose of this study was to establish whether there were differences in the spatiotemporal parameters of gait between older adults with and without chronic LBP (CLBP). We hypothesized that older adults with chronic LBP would walk slower, have shorter stride lengths, wider stance widths, greater stance times and longer periods of double limb support time, as well as greater variability in step length, stance time and double limb support time.

METHODS: Participants. Community-dwelling, cognitively-intact, older adults between the ages of 60 and 85 years with and without CLBP were recruited. Participants were excluded if he/she had (1) a history of low back surgery, (2) received services for LBP in the past 6 months, (3) severely impaired mobility, (4) non-mechanical LBP. For inclusion, participants with CLBP had to score ≥ 14/16 on the modified Oswestry Low Back Pain Questionnaire, which is a disease-specific measure of disability used in patients with LBP where higher scores indicate greater disability. For inclusion, pain rating at “worst” per the Pain Thermometer had to be ≥7/10 for those with CLBP and ≤2/10 for those without pain within the past month. Individuals in the control group could not have “current” LBP.

Procedures. The GaitMat IT™ system, a computerized 4 meter long walkway, was used to collect and analyze gait data. At either end of the 4-meter long walkway, there are inactive segments (1 meter) which allow for walking acceleration and deceleration. As fast as two participants walked on the GaitMat IT™ three times at their self-selected walking speed for the final data collection. The following gait characteristics were measured: velocity, stride length, support base, stance time and double limb support time. Measures of gait variability were determined by calculating the standard deviations of stride length, stance width, stance time and double limb support time from all of the right and left steps recorded during the three trials used for final data collection. All participants reviewed and signed a consent form approved by the University of Delaware Human Subjects Review Board.

Data Analysis. Statistical analyses were performed using SPSS (SPSS, Inc., Chicago, IL). Multivariate analysis of covariance (MANCOVA), based on the unweighted general linear model, was used to establish between-group differences in terms of gait characteristics. When the MANOVA showed significant differences between older adults with and without chronic LBP, univariate ANCOVAs were examined to further explore between-group differences. All analyses were adjusted for age, sex, and body mass index (BMI).

RESULTS: This analysis included 82 participants (64% female) of whom 41 had CLP and 41 were pain-free. The mean age was 71.53±6.57 years. There were no significant differences between the groups for any demographic variables. MANCOVA indicated a significant overall difference between groups for spatiotemporal parameters of gait (F=5.68; p<0.001) and for measures of gait variability (F=2.56; p=0.034). Follow-up univariate analyses indicated significant differences between groups as seen in the tables below (see tables 1 and 2):

DISCUSSION: This is the first study to elucidate the gait characteristics of older adults with CLBP beyond just speed. As hypothesized, older adults with CLBP had shorter stride lengths, greater stance times and longer periods of double support time, as well as slower walking speeds. These spatial (stride length) and temporal parameters (stance time and double support time) are individual components of gait that are specifically related to gait speed; and, these results may provide us with a first glimpse into why other studies have consistently shown slower walking speeds among older adults with LBP. Given the fact that gait speed is a strong predictor of future mobility limitations among older adults, it is clear that the CLBP population is certainly at greater risk for mobility declines than their pain-free counterparts. Further, participants with CLBP in our sample demonstrated greater variability in stride length and double limb support time. Greater variability in these gait characteristics has been associated with falls among community-dwelling older adults. Our findings may begin to explain why other studies have demonstrated that older adults with CLBP are at increased risk for falling as compared to pain-free elders. Future work should focus on gait characteristics as an important outcome and whether pain interventions can improve gait parameters, thereby decreasing the risk for future mobility decline.

REFERENCES:

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