Original Research

The Effect of Maternity Support Belts on Postural Balance in Pregnancy

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Objective: The purpose of this study was to evaluate the effect of maternity support belts (MSB) on postural balance during pregnancy.
Design: Prospective, observational cohort study.
Setting: Outpatient visits at a university hospital, obstetrics and gynecology clinic.
Participants: A total of 90 pregnant women in first, second, and third trimesters of pregnancy; 30 pregnant women for each trimester.
Methods: Dynamic and postural stability by using a Biodex Stability System and comparing pregnant women with and without an MSB in each cohort group.
Main Outcome Measures: Overall, anterior-posterior stability index, medial-lateral stability index, and fall risk test (FRT) scores were obtained with 1 stance at platform stability of level 8. Four measurements from the Biodex Stability System were compared between pregnant women with and without an MSB in each group.
Results: The scores of anterior-posterior stability index and FRT were significantly lower in the first-trimester group with an MSB than without an MSB ($P < .05$). Medial-lateral stability index and FRT scores were significantly lower in the second-trimester group with an MSB than without an MSB ($P < .05$). In the third-trimester group, overall, medial-lateral stability index, and FRT scores were lower for participants with an MSB compared with participants without an MSB ($P < .05$). In all trimester groups, FRT scores were detected to be lower in pregnant women with an MSB than in those without an MSB ($P < .05$).
Conclusions: MSB use improves impaired balance and FRT scores during all periods of pregnancy, especially in the third trimester. MSB is useful for fall prevention during pregnancy, especially during the third trimester.

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INTRODUCTION

Pregnant women are at higher risk for falls than women who are not pregnant. Although 27% of women fall during their pregnancy, 10% of them experience 2 or more falls [1]. A fall during pregnancy may result in maternal injuries such as bone fractures, joint sprains, muscle strains, head injury, rupture of internal organs, internal hemorrhage, abruptio placenta, rupture of the uterus and membranes, and occasionally maternal death or intrauterine fetal demise [2,3].

Pregnancy-related pelvic pain from presumed joint laxity is a common and disabling problem [4]. Many methods are used for management of pelvic joint laxity during pregnancy; 1 of these strategies is use of a maternity support belt (MSB). A supportive belt decreases joint laxity if it is fitted to apply compression at the anterior superior iliac spine [5]. MSBs are regarded as safe, low-cost, and accessible devices, and are used for the management of low back and/or pelvic pain symptoms [6,7]. The belt application has been shown to have a mechanical effect of reducing the mobility, laxity, and sagittal rotation of the sacroiliac joints in women with pregnancy-related pelvic girdle pain [5,8,9].

Numerous hormonal, anatomic, and physiological states change during the course of gestation, such as substantial weight gain, increased ligamentous laxity, increased spinal lordosis, decreased neuromuscular control and coordination, decreased abdominal muscle strength, biomechanics alteration, and an anterior shift in the location of the center of body

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mass [10-13]. These anatomic, hormonal, and physiological changes may be related to increased risk of falling during gestation. The Biodex Balance System (BBS) (Biodex Medical Systems, Shirley, NY) is a valuable measurement system that evaluates postural stability with different clinical situations, for example, nonspecific low back pain in adults and rheumatoid arthritis [14,15]. Currently, there are no published studies related to the effect of an MSB on postural balance during pregnancy. We hypothesized that the use of an MSB would positively affect postural balance in pregnant women. The purpose of this study was to investigate the effect of an MSB on postural stability during pregnancy.

METHODS

Pregnant women 18-40 years of age were recruited and grouped by trimester as determined by their estimated date of confinement. Groups included 30 women each. Comparisons of dynamic and postural stability with and without an MSB were made within the groups and between groups as measured by the Biodex Balance System (version 3.1). The groups were compared by age, gravidity, parity, height, weight, and body mass index. The study protocol was reviewed and approved by the medical ethics committee of our institution. All the participants gave their written informed consent to participate in the study. Exclusion criteria included the following medical conditions: multiple pregnancies, gestational diabetes mellitus, hypertension, preeclampsia, a pregnancy considered by an obstetrician to be high risk, musculoskeletal or neurologic abnormalities, severe low back pain (unable to perform regular work duties), pain due to preterm labor, and any other medical condition that would affect postural stability.

The MSB is made of cotton and has a flexible elastic structure (Varitex Ortopedi Sanayii, Istanbul). The appropriate belt size, based on height and weight, is used for each participant. Small, medium, and large types of belt with a length of 70, 90, 100 cm, respectively; and with an anterior-posterior width of 15 × 25, 20 × 30, 25 × 35 cm, respectively, were used in this study. The belt was placed on participants at the level of the anterior superior iliac spine in lateral sides, lower lumbar region around the back, and between the pubis and the umbilicus in the front (Figure 1).

A measurement of dynamic postural stability was performed by using the BBS, which consists of a movable balance platform that provides up to 20° of surface tilt in a 360° range of motion. The platform is interfaced with computer software (version 3.1; Biodex) that enables the device to serve as an objective assessment of balance. The measure of postural stability includes the overall (overall stability index [OA]), the anterior-posterior (anterior-posterior stability index [APSI]), the medial-lateral (medial-lateral stability index [MLSI]) scores, and the risk of falling (fall risk test [FRT]) scores. The range of scores is between 0° and 20° for all stability indexes. A high score in the stability indexes indicates poor balance [16]. Dynamic postural balance was assessed by using measurements obtained from the BBS at level 8. The system's difficulty levels change from 1 (most difficult) to 8 (easiest). For the RFT, the platform was set at level 8 because it is used as the stable level for all subjects, and all patients were tested at the same platform level. Measurements were obtained from mean of 3 times 20-second-interval trials. Four measurements from the BBS were compared between pregnant women with and without MSB in each group. All data were analyzed by using the Statistical Package for the Social Sciences Version 18.0 (SPSS Inc, Chicago, IL). Analysis of variance with the Dunnett post hoc test was used to analyze between-group differences. Differences between the pregnant women with or those without a belt for each group were assessed by using the Mann-Whitney U test for categorized variables, and the Student t test for continuous variables. $P < .05$ was considered significant.

Figure 1. Position of maternity support belt as used in the study.

RESULTS

A comparison of the demographic characteristics of the groups included in the study is given in Table 1. Demographic data regarding age and number of births and