https://doi.org/10.37723/jumdc.v14i2.769

J. Univ. Med. Dent. Coll.2023;Vol.14(2): 618-625
ISSN (Print) 2221-7827, ISSN (Online) 2310-5542
https://www.jumdc.com

Narrative Review Article

Open Access

A Narrative Review: Are Maternity Orthosis Effective?

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ABSTRACT

Purpose of Review: Maternity orthoses (MO) are extensively accessible, frequently recommended, and widely used to relieve pelvic girdle pain (PGP) and lower back pain (LBP) during pregnancy. The aim of this study is to perform a literature evaluation on the outcomes of utilizing MO as the exclusive intervention for improving women's comfort during pregnancy.
Recent Findings: The included studies yielded four outcomes: pain relief, balance enhancement, functional assistance and mobility improvement. More than 200 publications were reviewed, with no material published before 2015. This study also presents knowledge of the impacts and effectiveness of using MO as the only intervention for improving pregnancy comfort, as well as information regarding the many types of MO which are commonly available. As a result, instruction about the use of belts and follow-up of usage of the belt during and after pregnancy can be found to be vital in the care of misaligned pelvic in women. The findings might be utilized to promote the beneficial usage of MO throughout the perinatal to the postpartum period.
Summary: This research provides knowledge of the effects and efficacy of using MO as a solitary intervention for improving pregnancy comfort and information on the many types of MO and the characteristics that may impact orthoses usage. Furthermore, utilizing MO for an incredible duration might impede child growth due to a lack of capacious room in the womb due to external pressure. This important factor should be explored more with physiological experimentation and reported accordingly to describe the effectiveness of MO and its effects on the womb.
KEYWORDS: Maternity Support Garments, Pregnancy, Orthotics, Maternity Orthoses, Lower-Back Pain, Pelvic-Girdle Pain.

INTRODUCTION

Pregnancy causes significant changes in human physiology. Although these changes are regarded as biologically normal, each woman may suffer various symptoms and discomfort levels as a result of them [1].

During pregnancy, musculoskeletal discomforts and aches are typical. Pelvic girdle pain (PGP) affects 20% of women, while lower back pain (LBP) affects more than 65% of women, with the symptoms happening independently or simultaneously and affecting the execution of Activities of Daily Living (ADL), limiting women's quality of life (QOL), and in some circumstances directing to truancy and even incapacity [2]. Relapse rates for LBP and PGP are significant in future pregnancies, with a frequency of 24.7 percent after postpartum. There are several proposed etiologies for pregnant PGP and LBP, such as anatomical or mechanical alterations and hormonal fluctuations that impact the pubis symphysis and SIJ on the pelvic bone, resulting in joint laxity, as well as inflammation [3].

Prenatal experts have suggested that PGP and LBP therapies include instructions for the individual to be mobile and maintain regular ADLs, as well as advising particular exercises when necessary or referring to a physiotherapist for more specialized treatment such as massage, exercise, acupuncture, chiropractic, Reiki, yoga, aromatherapy and the usage of maternity orthoses (MO) are all recommended as non-pharmacologic therapies [4].

MOs are garments or supports meant to support pregnant women's abdomen and lower back while also ensuring the safety of the growing baby. These garments are commonly advised by professionals and worn by pregnant women as a simple, secure, economical and easily available treatment for managing LBP and PGP. MO should offer the user essential comfort and support. These requirements

How to cite this: *Yar UB. A Narrative Review: Are Maternity Orthosis Effective?. Journal of University Medical & Dental College. 2023;14(2):618-625.*

are more essential to the pregnant lady than the societal pressure to conceal pregnancy or the aesthetic aspects of the garment itself, which have now devolved into secondary considerations. Secondly, and perhaps most significantly, a visually appealing maternity style reflects women's desire to stay stylish while pregnant, retaining their pre-pregnancy individuality via apparel [5].

Mercantile-accessible items such as belts or cradles and torso support aim to alleviate pregnancy-related discomfort by providing support in the pelvic and lumbar areas [6]. Some of the garment's conjectured effects include providing pressure mechanisms, increasing kinesthesia, reducing vertebral motion, bolstering the pelvis and lumbar, minimizing mechanical loads, and vitalizing the abdominal muscle action, including pelvic floor and spine, which also provides satisfaction to the user [7].

Furthermore, MO is prescribed by many clinicians these days and awareness is also increasing day by day in women and making it impossible to determine their efficacy as a stand-alone intervention. Specifically in Pakistan, there is a huge gap, where no such study is done to provide an insight into MO, but literature agrees that MO is effective in pregnancy [4] and considering this point, the aim of this review is to assess the current research on the impacts of using MO as the solitary treatment during pregnancy.

Maternity Orthoses and their Effectiveness in Pregnancy:

The design of MO is necessary to fulfil essential ergonomic demands and would be aided by understanding the comfort needs of pregnant women and the implications of various support characteristics. LBP in pregnancy is a frequent and serious health issue. MO is thought to be a handy and safe treatment for stabilizing the lumbar spine and relieving discomfort. Discomfort and inconvenience, on the other hand, are likely to have an impact on patient satisfaction.

There are several sorts of support garments available for pregnant women and new moms at the moment. It might be difficult to know which items are best for each stage of pregnancy and postpartum. The following are the most common forms of MO:

- **Belly Bands:**

Belly bands are stretchable bands worn around the abdomen by women to prolong the life of pre-pregnancy clothes. They also serve as a covering to conceal skin that becomes exposed as the abdomen grows. Some belly bands provide assistance to the lumbar and gluteal regions and exert moderate compression. Belly bands are still trendy among pregnant women, and they are available in a variety of sizes, shades and styles. They frequently feature some flexible border to keep them fit snugly. Belly bands are also known as maternity bands, belly sleeves or pregnancy bands [8].

- **Belly Belts:**

Belly belts are stiff belts that wrap around the belly during pregnancy to assist in supporting the lumbar, abdomen, hips and pelvic. Belly belts are generally worn over clothing; however, some people wear them beneath. Belly belts are often narrower and have a strap, particularly the section that runs across the front of the abdomen. Belly belts are sometimes known as pregnancy or maternal belts, straps or braces [8].

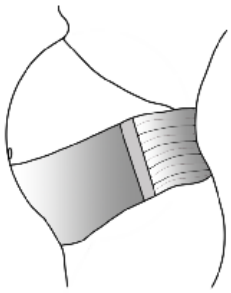

Figure-I: A belly band.

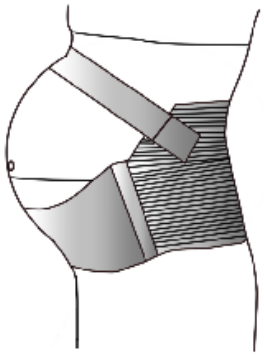

Figure-II: A belly or maternal belt.

- **Prenatal or Maternity Cradle and Girdles:**

Prenatal cradles are made consisting of a belly belt that wraps around the lower torso and an upper harness that expands over the top of the abdomen. These together provide room for the abdomen. While certain pregnant cradles may be purchased separately, they are frequently sold as incorporated into belly belts or in combo packs with them.

Figure-III: Prenatal or Maternity Cradles.

- **Postpartum Belly Wraps:**

Additional layers of alternating elastic and stiff wrapping reach from beneath the breasts to the hips in postpartum

belly wraps and girdles. Despite the fact that there is little unbiased evidence to back up their usage, most postpartum belly wraps claim to aid by [9]:

1. Helping to support the lower back.
2. Accelerating postpartum healing, particularly after a cesarean birth.
3. Increased supply of blood.

Figure-IV-V: Different types of Postpartum Belly Wraps (Velcro) left and (Zipped) right.

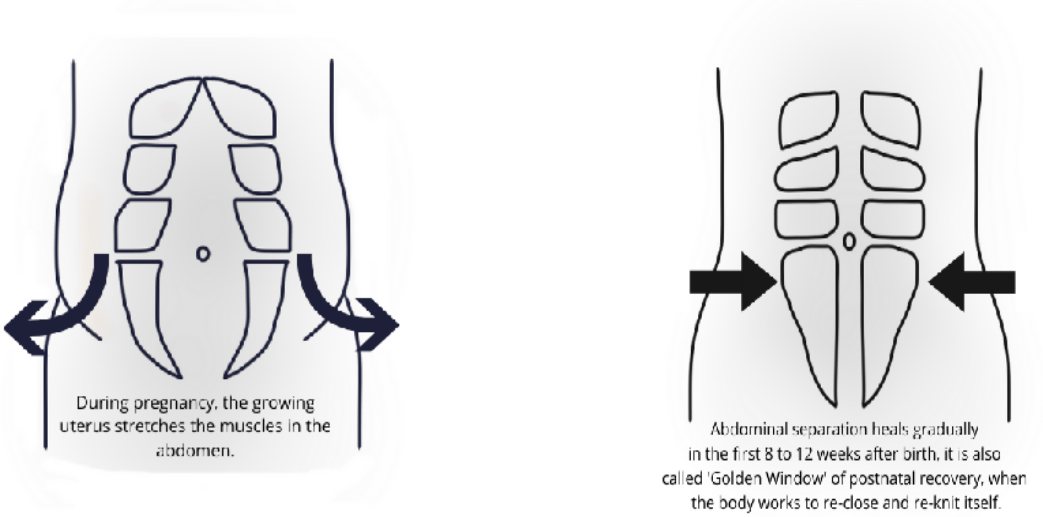

Figure-VI-VII: Abdominal muscles during pregnancy (left) and after pregnancy (right).

- **Compression Shorts and Leggings:**

Compression garments (CG) are clothes that fit firmly around the skin. In medical settings, CG can help patients who have to stand for long or have circulation problems. CG may aid in the prevention of DVT and the reduction of swelling. It can also be utilized to aid in the healing process following surgeries [10]. CG had little but highly probable advantages [p 0.001, ES = 0.38 (95 percent CI 0.25, 0.51)]. The greatest advantages of CG are for strength recovery from 2 to 8 h and >24 h. In terms of exercise modality, compression improved recovery from resistance training the greatest, especially at time periods greater than 24 hours [11].

- **Dynamic Elastomeric Fabric Orthoses (DEFOs):**

DEFO's are tight orthoses made of Lycra or similar elastomeric materials that are fitted to the afflicted body areas. It is hypothesized that these orthoses have a paratonic torsion and compressive action that improves misalignment and biomechanical and neuromuscular functioning. The use of DEFO may help to lessen pain and the impact of postnatal issues on women's functional abilities and quality of life. This non-pharmacological intervention is a good substitute for healthcare professionals to educate and counsel women on the postpartum period because it is low-cost and has no adverse events or side effects [12].

Effects of Maternity Orthoses on Pain Alleviation

- **Low Back Pain:**

According to many studies, LBP is one of the most common discomforts experiences, affecting roughly 50% to 80% of pregnant women [13]. It has been observed that LBP impairs daily activities throughout pregnancy [14] and the fact that the level of maternity leave was high, i.e. 74.2 percent [15]. LBP is most commonly associated with posterior pelvic pain or sacroiliac, with lumbar pain being the most frequent. LBP is

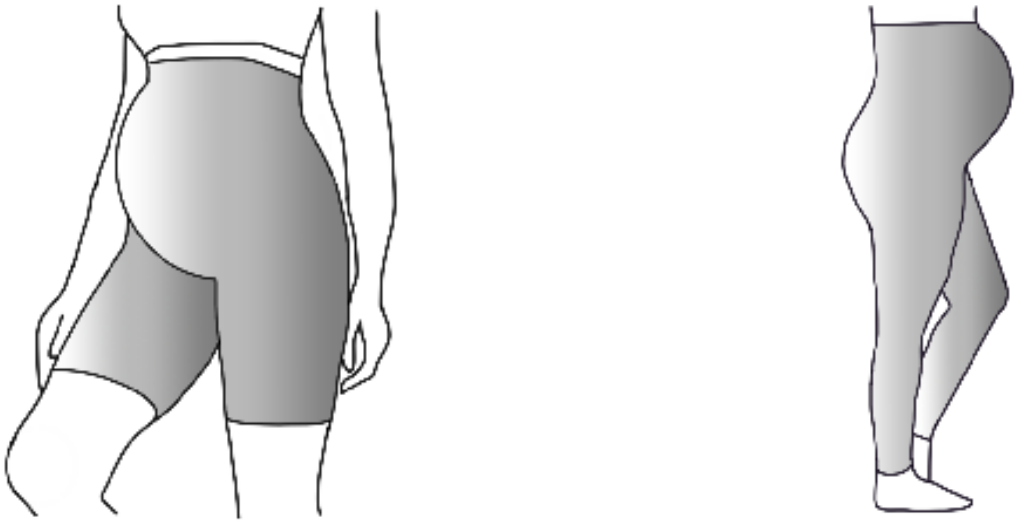

Figure-VIII-IX: Compression shorts (left) and compression leggings (right).

caused by a variety of factors, including changes in posture, weight gain, changes in posture, hormonal swings, muscular exhaustion and increased pressure on bodily formation due to abdominal heaviness [16].

A number of trials examining modern non-pharmacological interventions for LBP have been discovered, such as progressive muscle relaxation, Kinesio Taping, spinal and osteopathic manipulative therapy, neuro-emotional techniques, TENS, and the use of MOs (belts and support garments) showing good outcomes for LBP relief and improvement[17,18,19,20]. The research concluded that utilizing MOs resulted in greater LBP reduction depending on pregnancy pain ratings, although more research on the benefits of MOs on LBP relief is needed. While MOs might be reliable, minimal, and easily available for an enormous number of pregnant women suffering from LBP [6].

Additional studies revealed the usefulness of MOs for LBP relief and assessed the effect of donning MOs on LBP severity related to functional inability and satisfaction. The MOs used in the study included a full torso garment with shoulder straps made of polyamide and elastane along with a flexural panel that sits underneath of abdomen, as well as a control garment that is an elastic one-piece tube-like structure that sits under the breast and reaches the groin region. According to the findings, the garments significantly reduced the intensity of LBP and PP in pregnancies determined by visual scale (VAS) ratings at the initial to the final stage, but there was no considerable improvement in satisfaction with life scale (SWLS) levels. Participants wearing the garment used fewer analgesic medicines than those wearing the control garment, implying that the study was more effective as a therapy than the control garment [9].

- Pelvic Girdle Pain:

PGP is a frequent problem throughout pregnancy, with a peak frequency of PGP occurring between 24 and 36 weeks of gestation [21], and it impairs ADL performance during pregnancy [14]. PGP causes, like LBP, are not completely known, although lack of stability, SIJ laxity and biomechanical alterations have been cited as the major reasons for PGP [16].

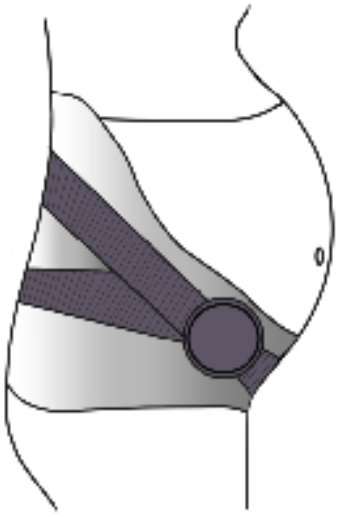

Figure-X: A Dynamic Elastomeric Fabric Orthoses (DEFOs) for pregnancy period.

Non-pharmacological therapies for PGP have been studied, including teaching body ergonomics and correct body movements, core stability techniques, and the usage of lumbopelvic or sacroiliac belts [22]. Furthermore, these therapies are easily available, which is essential for symptom control science [23]. It is claimed that belts apply pressure, reduce joint movement in the pelvic girdle region, and increase stability, therefore decreasing discomfort. There are three trials that used MOs as the only intervention for PGP relief, and all of them revealed favourable outcomes. The following is a description:

The first study reported that pregnant women with PGP (n=105) were randomly assigned to three groups: a control group (n=35) that received instructions, an exercise group (n=31) that was asked to perform specific pelvic stabilizing exercises at home in addition with instructions, and a belt group (n=31) that received a non-rigid lumbopelvic belt with instructions. The participant's pain intensity and functional status were evaluated using a VAS and ODI accordingly. The WHOQOL-BREF questionnaire was used to assess the respondent's QOL. All data were measured at the beginning of the research, three and six weeks later. At both the 3 and 6-week follow-ups, the pain score of patients in the belt group was crucially lower than that of the other groups. The average ODI score of patients in the belt group improved significantly more than that of the control group and exercises [21].

The second study investigated the frequency of use, effectiveness and tolerance of 2 distinct pelvic belts as the lone medical care for pubic symphyseal pain relief. The study employed a non-rigid neoprene belt and a rigid nylon webbing and foam-lined belt. The findings of this study indicated a 36% reduction in PSFS scores in the non-rigid belt group and a 34% reduction in the rigid belt group. It was observed that ADLs were primarily onerous for women to carry out but that they managed to improve through the use of MOs. VAS scores were notably lower, including both groups (p=0.018), but there was no shift in as a whole MODQ or PSFS scores. Non-rigid belts reduced scores more than rigid belts and were preferred in terms of comfort. The findings support the use of MOs to alleviate PGP and enhance functional mobility [17].

The third study evaluated the usefulness of support belts as a single intervention for reducing PGP and improving women's functional ability during pregnancy. The researchers used two belts in the study: a narrow (non-rigid) belt and an adjustable wide (rigid) belt with metal or aluminium under-prop in the lumbar region. According to the findings of this study, women wore belts for daily activities (55%), going out (42%), and gait (37%), with 48% reporting a reduction in pain and 63% reporting an increase in support. The study observed no major variations in alleviating pain between the two study belts; however, the narrow belts group demonstrated a significant reduction in pain intensity (p=0.001) and pain intensity at the SIJ (p=0.003), while the wider belts group demonstrated a marked decline in spine pain (p=0.01) [10].

PGP was reduced in all studies that used MOs. However, in all studies reviewed, the application of MOs was influenced by the construction and materials underlying the body part, its possible mechanism of action (remain unknown) and its pressure distribution.

Effects of Maternity Orthoses on Balance:

Due to anatomical, hormonal, and physiological changes during pregnancy, weight is gained, abdominal muscle strength and neuromuscular control are decreased, ligamentous laxity is increased, and the spine adapts lordosis curvature [24]. This alteration modifies the centre of gravity, changing musculoskeletal equilibrium and raising the chance of falling. Maternal and fetal complications, including head injuries, bone fractures, internal haemorrhage, uterine rupture, placental abruption etc., can occur during pregnancy. Preventive measures may include regular exercise and the usage of MOs, which can enhance postural control and reduce the possibility of pregnancy falls [24].

During pregnancy and after childbirth, pelvic alignment changes. Pelvic belts apply external forces to the joints, compressing and stabilizing them, thus influencing pelvic alignment. However, there is little information available about this potential effect. Pelvic alignment assessments, such as posterior and anterior pelvic width, pelvic imbalance, and usage of the pelvic belt during and after pregnancy, were investigated. Based on the usage of a pelvic belt, entrants were split into four groups: before childbirth (BC), before and after childbirth (BAC), non-use (NU) and childbirth only (AC).

The amount of change in pelvic alignment from late pregnancy to post-childbirth was then compared using a one-way ANOVA. Following the preliminary analysis, a multivariate regression analysis was conducted to identify the significant statistical differences in order to account for other variables that altered pelvic alignment, including BMI, age, number of prior childbirths, vaginal delivery, and pelvic asymmetry in delayed gestation. Subsequently, based on the weekly term of pelvic belt use, a median point for subgroup segmentation was selected, and inter-group variations in pelvic alignment were examined. According to the initial one-way ANOVA, the decrease in pelvic asymmetry for BAC from pregnancy to postpartum was greater than that for AC.

Furthermore, when the group cutoff time was 7 hours per week, pelvic asymmetry decreased in the BAC group while increasing or remaining unchanged in the NU and AC groups. Continuous and prolonged use of pelvic belts during and after pregnancy may be associated with changes in pelvic asymmetry during the perinatal period. As a result, correct and comfortable usage instructions, as well as the suggestion of constant use of a pelvic belt, are required for the prevention of some discomforts associated with pelvic mal-alignment [25].

Effects of Maternity Orthoses on Functionality and Mobility:

Various studies indicate that approximately 50-80% of pregnant women experience pregnancy pains, with symptoms varying in duration and limiting the quality of ADL, such as sitting, sleeping, bending and walking, impose negative effects on QOL during pregnancy [9]. Multiple researchers agreed that physical inconveniences during gestation are linked with changes in physique, weight, and hormonal and musculoskeletal variations. However, because the discomforts are temporary, they are regarded as predicted normal during pregnancy.

Different studies suggested that the MOs were efficacious in decreasing the pain in normal activities such as: getting up from a seated position, sleeping and walking, while the MOs were suggested during active hours, a significant influence of its use is reported without any further recommendations on how the MOs mechanism worked [9].

Depending on biomechanical and medical trials, a theoretical model of pelvic function emphasizes the interactivity of the bony interlocking mechanisms of the pelvic joints and the support provided by surrounding ligaments, fascia, and muscles. Inadequacies in some of these aspects could lead to inappropriate pelvic motion, causing pain. Pelvic belts are often used to correct symphyseal pain during the prenatal and after the postpartum phase. Belts are thought to restrict exorbitant motion by employing an external force that compresses and stagnates the joints, ultimately resulting in a self-bracing outcome [17,26].

One research studied the role of MOs on the physical functioning of pregnant women, revealing unique pilot data confirming that the use of a pelvic belt may enhance everyday functionality and mobility as measured by the PSFS over a three-week period. However, these findings need to be validated in a larger randomized controlled trial with a suitable control group [17].

DISCUSSION

An expanding uterus strains and weakens abdominal muscles, piling burden on lumbar muscles, which offset the loss of abdominal muscular tone and endurance. In addition, the pelvis rotates sagittally about the second sacral region, which serves as a fulcrum (Figure-XI). As a result of the pregnancy uterus shifts the woman's center of gravity forward, and reparative hyperlordosis develops. This movement adds another flexion motion to the lumbar region, leading to increased load on the lumbar musculature. Furthermore, when the center of gravity changes anteriorly, anterior pelvic tilt rises, putting more strain on the sacroiliac ligaments as these structures continue to overcome this forward pelvic rotation.

As the pregnancy develops, these sacroiliac ligaments grow loose, allowing for greater forward pelvic rotation and lumbar spine hyperlordosis, putting additional strain on the pelvis and low back [14].

During pregnancy, many pregnant women have pelvic discomfort. Pregnancy can alter pelvic geometry while generating micro-mobility, resulting in some instability, which manifests as discomfort and increased fatigue when walking. Pelvic belts may assist in restoring stability and minimize discomfort, allowing motor actions such as walking to be performed more easily. However, there are no regulations governing the usage of pelvic belts.

According to one research, there was no significant change in gait characteristics based on belt type or location. Gait velocity was decreased in pregnant women. The stages of the gait cycle were altered by increasing the stance phase and using double support.

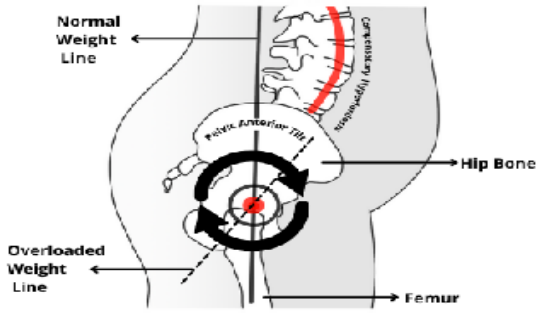

Figure-XI: An illustration of anterior pelvic tilt and compensatory hyperlordosis.

This implies that pregnant women should be encouraged to wear any sort of belt and in any posture [27]. Pregnant women should use the following (Table-I) healthy sitting and standing positions to avoid discomfort and postural pressures:

Table-I: Describes healthy sitting and standing positions to avoid discomfort and postural pressures for pregnant women.

Standing Posture	Sitting Posture
Keep the pelvic tilt at all times to prevent your lower back from swaying forward [28].	Keep the pelvic tilt and avoid hunching [28].
Contract your core and buttock muscles to create a natural corset for your lower back [28].	Sit in a chair that supports the length of your thighs and avoid sitting with your legs hanging [28].
Maintain a chin tuck. Avoid standing in one position for long periods of time, and keep your ears in a straight line with your shoulders [28].	Sit with your knees parallel to your hips. Avoid sitting in the same position or for long periods of time. Sit for a short period of time (10 to 15 minutes) and remember to regularly adjust and change positions [28].
High heels should be avoided because they cause your body weight to shift forward even more. Put on low-heeled, comfortable shoes [28].	You should not cross your legs. This position reduces circulation and may result in ankle swelling or varicose veins [28].
Put one foot on a step stool or sit on a high stool when doing any work that requires you to stand for an extended amount of time, such as ironing or doing dishes. This will help to reduce sway in the lower back, and one should also consider wearing a MOs [28].	Avoid twisting at the waist whenever you need to turn. It is preferable to turn your entire body. Avoid bending forward as well. This may result in abnormal abdominal pressure [28].

RESULTS

During the review, it was determined that using MOs during and after pregnancy is beneficial in women, such as in LBP and PGP relief, improved functioning and postpartum phase. This study also presents insight into the impacts and effectiveness of using MOs as the only intervention for improving pregnancy comfort, as well as information regarding the many types of MOs that are commonly available. Continuous and extended usage of pelvic belts during and after pregnancy was linked to changes in pelvic asymmetry during the perinatal period. It is conceivable that wearing a pelvic belt after delivery minimizes pelvic widening.

MOs can help to reduce the risk of hernia tears during pregnancy. However, more research is needed since there might be some negative consequences associated with reduced pelvic width during pregnancy. Furthermore, utilizing MOs for an incredible duration might impede child growth owing to a lack of capacious room in the womb as a result of external pressure. As a result, instructions in pelvic belt use and follow-up of usage of the belt during and after pregnancy can be found to play a vital role in the care of pelvic mal-alignment in women. The findings might be utilized to promote the beneficial usage of MOs throughout the perinatal to the postpartum period.

CONCLUSION

This review discusses the usage of MOs as the solitary therapeutic treatment for the relief of pregnancy discomforts, divulging that choosing to wear MOs throughout gestation could have positive effects, including reducing pain at LB, PG, PP and SIJ), improved functionality and mobility, and reduced risk of miscarriage. Even though there is significant evidence that MOs are helpful in pain relief, improving balance, and improving functioning with mobility in pregnant women, it is vital to develop and implement guidelines for the MOs selection and utilization to the potential treatment usage as well as wearer's necessitates, but also to analyze the fabrication with physical characteristics of the textile materials used in the MOs to recognize their influence on MOs wearer comfort and effectiveness, as well as the possible mechanical effects of MO's.

ACKNOWLEDGEMENT: None.
CONFLICT OF INTEREST: None.
GRANT SUPPORT AND FINANCIAL DISCLOSURE: None.

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Authors' Contributions:

Usama Bin Yar: Entire manuscript write-up, drawing of illustrations and referencing.

Submitted for publication: 30-08-2022
Accepted after revision: 17-04-2023