

## Postural Health in Women: The Role of Physiotherapy

This guideline is a joint policy statement provided by the Canadian Physiotherapy Association for the Society of Obstetricians and Gynaecologists of Canada.

### AUTHORS

S.J. Britnell BScPT, Vancouver BC

J.V. Cole BScPT, Vancouver BC

L. Isherwood, BScPT, Vancouver BC

M.M. Sran, PT, PhD, Vancouver BC, research assistance and support

N. Britnell, BScPT, Vancouver BC

S. Burgi, BSRPT/OT, Vancouver BC

G. Candido, BScPT, Vancouver BC

L. Watson, BScPT, Vancouver BC

### Abstract

**Objective:** To advise obstetric and gynaecology care providers of the physical, psychological, and environmental factors that affect women's posture throughout their lifespan, from adolescence to menopause. To outline the physiotherapy management of obstetrics, osteoporosis, and urinary incontinence in women and to identify recommendations for referral to a physiotherapist.

**Outcomes:** Knowledge of abnormal postures, contributing factors and recommendations for physiotherapy management.

**Evidence:** MEDLINE, PEDro, and Cochrane Library Search from 1992 to 2003 for English-language articles and references from current textbooks related to posture and women's health conditions that are managed by physiotherapists.

**Values:** The evidence collected was reviewed by the authors and quantified using the evaluation of evidence guidelines developed by the Canadian Task Force on the Periodic Health Exam.

### Recommendations:

1. Pelvic floor muscle training with a physiotherapist is recommended to prevent urinary incontinence during pregnancy and after delivery (I-A).

**Key Words:** Posture, physiotherapy, perinatal, osteoporosis, urinary incontinence, women's health

2. Core stability training with a physiotherapist is recommended to prevent and treat back and pelvic pain during and following pregnancy (I-B).
3. Physiotherapist-prescribed exercises are recommended for women to elicit positive changes in bone mass and to reduce fall and fracture risk (I-A).
4. Pelvic floor muscle training with a physiotherapist is recommended for women with stress urinary incontinence (I-A).

The Canadian Physiotherapy Association and Society of Obstetricians and Gynaecologists of Canada have developed this joint policy statement regarding posture in women's health that highlights the physical, psychological, and environmental factors that affect women's posture throughout their lifespan, from adolescence to menopause. This statement outlines the role of physiotherapy in the assessment and treatment of women's posture; outlines the physiotherapy management of obstetrics, osteoporosis, and urinary incontinence; and identifies recommendations for referral to a physiotherapist.

The quality of evidence and classification of recommendations have been adapted from the Report of the Canadian Task Force on the Periodic Health Exam (Table 1).<sup>1</sup>

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### INTRODUCTION

As primary health care professionals, physiotherapists are committed to:

- improving and maintaining functional independence and physical performance;
- preventing and managing pain, physical impairments, disabilities, and limits to participation in activities of daily living; and
- promoting fitness, health, and wellness.<sup>2</sup>

Physiotherapists are trained to assess the effects of injury, disease, or disorder on movement and function and have the skills to provide a comprehensive treatment plan to help restore or enhance function.

The Posture Committee of the American Academy of Orthopedic Surgeons defined posture as follows:

**These joint policy statements reflect emerging clinical and scientific advances as of the date issued and are subject to change. The information should not be construed as dictating an exclusive course of treatment or procedure to be followed. Local institutions can dictate amendments to these opinions. They should be well documented if modified at the local level. None of these contents may be reproduced in any form without prior written permission of the SOGC.**

**Table 1. Criteria for quality of evidence assessment and classification of recommendations**

Level of evidence*	Classification of recommendations†
I: Evidence obtained from at least one properly designed randomized controlled trial.	A. There is good evidence to support the recommendation for use of a diagnostic test, treatment, or intervention.
II-1: Evidence from well-designed controlled trials without randomization.	B. There is fair evidence to support the recommendation for use of a diagnostic test, treatment, or intervention.
II-2: Evidence from well-designed cohort (prospective or retrospective) or case-control studies, preferably from more than one centre or research group.	C. There is insufficient evidence to support the recommendation for use of a diagnostic test, treatment, or intervention.
II-3: Evidence from comparisons between times or places with or without the intervention. Dramatic results from uncontrolled experiments (such as the results of treatment with penicillin in the 1940s) could also be included in this category.	D. There is fair evidence not to support the recommendation for a diagnostic test, treatment, or intervention.
III: Opinions of respected authorities, based on clinical experience, descriptive studies, or reports of expert committees.	E. There is good evidence not to support the recommendation for use of a diagnostic test, treatment, or intervention.

\*The quality of evidence reported in these guidelines has been adapted from the evaluation of evidence criteria described in the Canadian Task Force on the Periodic Health Exam.<sup>1</sup>

†Recommendations included in these guidelines have been adapted from the classification of recommendations criteria described in the Canadian Task Force on the Periodic Health Exam.<sup>1</sup>

Posture is usually defined as the relative arrangement of the parts of the body.

Good posture is that state of muscular and skeletal balance which protects the supporting structures of the body against injury or progressive deformity irrespective of the attitude (erect, lying, squatting, stooping) in which these structures are working or resting. Under such conditions the muscles will function most efficiently, and the optimum positions are afforded for the thoracic and abdominal organs.

Poor posture is a faulty relationship of the various parts of the body that produces increased strain on the supporting structures and in which there is less efficient balance of the body over its base of support.<sup>3</sup>

Posture can also be regarded as the alignment of the musculoskeletal system in such a way that the body moves and functions with maximum efficiency. Using this description, postural alignment can be evaluated in terms of:

- muscle balance—the length and strength of the muscles working over a joint;
- joint position—in the alignment of the body;
- static posture—the musculoskeletal positioning at any position of rest;
- dynamic posture—the postural alignment maintained during movement.<sup>4</sup>

## EVALUATION

Posture has long been an important and vital part of physiotherapy assessment and treatment.<sup>5</sup> Various postural tools are available that have been validated with evidence-based research. These tools include the goniometer for joint range, flexicurve and inclinometer for spinal curvature, tape measure, wall grid, and plumb-line.<sup>6-9</sup> Many physiotherapists use more sophisticated equipment, including video, still and digital cameras, markers, and recently, Web-based image analysis.<sup>10</sup> Medical imaging techniques (e.g., X-ray, computed tomography [CT], and magnetic resonance imaging [MRI] scan)<sup>11</sup> can be used to assess posture and alignment when more serious pathology is suspected. These are indicated by the medical team when there is need to visualize bony or soft tissue changes, such as Scheuermann's disease or tibial stress fracture, and these are only indicated when deemed safe and appropriate (e.g., not during pregnancy).

Physiotherapists are taught to identify different postural patterns and are aware of the interplay between structural (mainly permanent bony) changes and nonstructural (non-permanent soft tissue) changes.<sup>12</sup> A comprehensive postural assessment consists of 3 essential components: examination of body alignment in standing, tests for joint flexibility and muscle length, and tests for muscle strength. Examination in standing includes static and dynamic postures and the assessment of bony architecture and alignment of the upper and lower quadrants for deviations from ideal posture. All physiotherapists are trained to identify the different abnormal postural patterns such as kyphosis and

lordosis, swayback, military, and flat back postures.<sup>13</sup> The spine may also have lateral deviations, such as scoliosis, and the pelvis may demonstrate excessive anterior, posterior, or oblique tilts. Common postural abnormalities may be detected in the upper quadrant; for example, head forward posture and change in scapular and glenohumeral position.<sup>14</sup> Common postural problems detected in the lower quadrant are hip ante or retroversion, genu valgus and varum, tibial torsion, and foot malalignment.<sup>14</sup>

Clients typically seek physiotherapy treatment for complaints of pain and loss of function. A postural analysis incorporating the postural tools outlined above is part of the physiotherapy assessment and not a complete assessment in itself. The conclusions made by the physiotherapist are based on a subjective and objective musculoskeletal assessment. By addressing and treating the identified postural concerns, in addition to other assessment findings, physiotherapists help their patients achieve their highest level of physical functioning.<sup>15</sup>

### **Adolescence (14 to 25 years)**

The positions and postures adopted by women can become habitual patterns. Early education and training in body mechanics can help to form positive postural habits, and help to develop and maintain optimal muscle balance and skeletal alignment. Adolescent girls have a period of rapid bone growth between the ages of 9.5 and 14.5 years.<sup>14</sup> The onset of menses contributes to the acquisition of peak bone mass and is enhanced by regular balanced exercise and good diet.<sup>14</sup>

Joint alignment, the position of the centre of gravity, and balanced musculature all contribute to optimal postural alignment. During adolescence, girls are prone to mechanical and societal influences that can lead to changes in postural alignment and the development of poor postural habits. Factors that contribute to increased thoracic kyphosis with subsequent loss of movement, protruding head position, and loss of shoulder range are induced by slouched sitting, ill-fitting school desks, and overloaded bags and backpacks. The growing propensity of sedentary hobbies, such as playing computer and video games and watching television, also contribute to the development of kypho-lordotic and swayback postures and muscle imbalance. Discomfort with changing body image, following growth spurts and body development, particularly breast changes, can further lead to shoulder protraction and thoracic joint stiffness setting the stage for muscle imbalance and dysfunction later in life.<sup>16</sup> Physical and sexual abuse and depression can also lead to changes in posture. The most common spinal deformity of adolescence is idiopathic structural scoliosis, which is best detected prior to menarche for optimum treatment outcomes.<sup>16</sup>

Competitive sports can stress the musculoskeletal systems of adolescent and young adult women, causing injuries and pain with the development of postural changes.<sup>16–18</sup> Conditions commonly associated with this age group are patellofemoral problems,<sup>16</sup> traction apophysitis (e.g., Osgood Schlatters), ankle injuries (e.g., inversion sprains), compartment syndromes (e.g., shin splints), and other acute and overuse injuries. Spinal problems include scoliosis, thoracic kyphosis (e.g., Scheuermann's disease), and spondylolysis. Adolescents are particularly susceptible to growth plate injuries, especially in the mid-pubertal period, in addition to long-bone stress factors and avulsion fractures.<sup>17</sup>

### **Adult (25 to 45 years)**

Postural changes between the ages of 25 and 45 years are no longer influenced by structural growth. Activities of daily living, including lifestyle choices, and occupational and sports activities may affect postural alignment and predispose adults to injury. Occupations that require prolonged static positioning, heavy manual work, shift work, and repetitive activities, as well as high-risk and competitive sports may all contribute to postural adaptations and resultant pain symptoms.

There are sociological and medical factors that affect postural change for this age group. The social expectations of cross-generational caregiving, financial stress, abuse (physical and sexual), high-risk social behaviours, such as excessive drinking and drug use, and fashion trends (e.g., high-heel shoes and tight clothing) can all contribute to postures that compromise joint position, muscle balance, and movement patterns.<sup>19</sup> Surgery, chronic illness, motor vehicle accidents, and mental health are other factors that can change a woman's posture.

These years are an optimal time for women to develop and maintain healthy postural and exercise habits before entering the middle and elder years, where postural changes may become more structural. Common conditions in this age group are anterior cruciate ligament injuries,<sup>20,21</sup> spinal dysfunctions, thoracic outlet syndrome, carpal tunnel syndrome, and bunions.<sup>21</sup>

### **Pregnancy and Postpartum**

There is a wide range of postural and physiological adaptations to the endocrine, musculoskeletal, circulatory, respiratory, and metabolic changes experienced by women during pregnancy. Physiological adaptations include a profound increase in body mass, retention of fluid, and laxity in supporting structures. Postural adaptations to these physiological changes usually entail an alteration in the loading and alignment of, and muscle forces along, the vertebral column and in the weight bearing joints.

Research has shown that postural adaptations typically attributed to pregnancy, such as a forward shift in the centre of gravity followed by an anterior pelvic tilt and subsequent increase in lumbar lordosis and thoracic kyphosis, seldom occur.<sup>22–24</sup> In fact, 75% of women demonstrate a more posterior posture, one in which the weight of the uterus is carried posterior to the normal centre of gravity.<sup>22</sup> Back and pelvic pain are well-recognized problems affecting many women during pregnancy,<sup>22</sup> and the onset and severity of these symptoms is often attributed to the postural adaptations of pregnancy. However, research has shown little correlation between postural adaptations and the incidence of back and pelvic pain.<sup>23–25</sup>

Prepregnancy postural habits tend to be exaggerated during pregnancy. Laxity in the supporting tissues, either preexisting or enhanced by the hormone relaxin, becomes greater in the direction of habitual posture.<sup>23</sup> For example, flat or pronated feet tend to become flatter, hyperextended knees tend to become more pronounced, and spinal curves tend to soften. Some women associate pregnancy with the onset of chronic back and pelvic pain and instability.<sup>22,25,26</sup> Increased ligament laxity has been postulated as a cause for back and pelvic pain,<sup>26</sup> particularly if pain arises early in the pregnancy before an increase in body mass is evident.<sup>27</sup> During the term of their pregnancy, most women adapt to these postural and physiological changes and, following the baby's delivery, return to their prepregnant state.

Many conditions are commonly found during pregnancy and postpartum periods. Spinal complaints may include lumbo-pelvic, pubic symphysis, and cervical and thoracic pain and dysfunctions. Other conditions may range from carpal tunnel syndrome and other neuropathies<sup>28</sup>; de Quervain's disease (tenosynovitis), diastasis rectus abdominus<sup>29</sup>; and incontinence<sup>30</sup> to pelvic floor trauma secondary to vaginal births.<sup>28</sup>

### **Menopause (age 45 to 65 years) and Beyond**

Musculoskeletal, urogenital, physiological, and vascular changes affecting women during menopause all have a significant impact on the essential characteristics of both bone and muscle. There is a generalized reduction in muscle strength and a decrease in endurance-type muscle fibres, which contributes to decreased exercise endurance.<sup>31</sup> Changes in muscle function and chronically shortened soft tissues can lead to faulty posture; this is exacerbated when coupled with preexisting poor postural habits (Table 2).

Women in this age group have a higher risk of developing osteoporosis, which is associated with a higher risk of nontraumatic fractures including vertebral compression fractures. The mechanical changes brought about by the fractures, such as their associated symptoms of pain, may

exacerbate age-related postural changes, including thoracic kyphosis, head and neck protrusion, reduced lumbar lordosis, and loss of height. Pain, loss of mobility, shortened abdominal and hip flexor muscles, and weak back and hip extensors may all lead to an altered centre of gravity and posture that affects balance and increases the risk of falling. An increase in thoracic kyphosis can also result in reduced respiratory capacity.

### **ROLE OF PHYSIOTHERAPY IN WOMEN'S HEALTH**

Physiotherapists are involved in the management of a range of women's health issues, including obstetrics, osteoporosis, and urinary incontinence. Physiotherapists also treat women with breast health concerns and a variety of neuro-musculoskeletal conditions, but a full discussion of these is outside the scope of this paper. Table 2 summarizes some of these conditions affecting women throughout the lifespan.

### **ROLE OF PHYSIOTHERAPY IN OBSTETRIC CARE**

Physiotherapy plays an important role in obstetrics both with the antepartum and postpartum woman (Table 2). Manual techniques and education regarding posture, back care, and modification of daily activities all help to ensure optimal postural alignment, which minimizes joint stress in pregnant women.<sup>32</sup> Physiotherapists instruct women in transversus abdominus, multifidus, and pelvic floor coactivation, which strengthens core stability and is beneficial in the prevention and treatment of back pain.<sup>32–37</sup> (These trials demonstrated positive results with the nonpregnant population and are concerned mostly with chronic back pain—for example, pain of more than 3 months duration. Trials directly applicable to the pregnant and postpartum populations are needed.<sup>33–36</sup>)

Postpartum physiotherapy assessment can identify postural and structural weaknesses arising from the pregnancy, delivery, or postpartum conditions. Effective treatment for correct muscle activation,<sup>35</sup> strengthening, and utilization of the necessary supporting structures can minimize pregnancy-adapted postures.<sup>32</sup>

Postpartum pelvic floor muscle (PFM) pain, dyspareunia, episodes of urinary<sup>30</sup> or fecal incontinence, abdominal diastasis,<sup>38</sup> and symptoms of pelvic joint dysfunction (affecting the sacroiliac joint and symphysis pubis)<sup>39</sup> are all conditions that can be treated with specific physiotherapy interventions. (Ergonomic training and education are key components to the ongoing physiotherapy management of women after childbirth. A growing number of physiotherapists have advanced skill in this important area of treatment.)

**Table 2. Indications for referral to a physiotherapist**

	Postural change	Conditions	Impaired function
Adolescence	Excessive thoracic kyphosis Scoliosis Hyperlordosis Head-forward posture Protracted shoulder girdle Genu valgus/varus Excessive pronation/supination (foot)	Idiopathic spinal/extremity dysfunction Sports or musculoskeletal injury	Decreased range of motion Pain with movement, with weight-bearing or with static postures
Pregnancy and Postpartum	Head-forward posture Protracted shoulder girdle Excessive thoracic kyphosis Altered lumbar lordosis Knee hyperextension Excessive pronation/supination (foot)	Thoracic, lumbo-pelvic, sacroiliac and pubic symphysis dysfunction Diastasis rectus abdominus Carpal tunnel Stress urinary incontinence Pelvic floor trauma	Analgic gait Decreased activity and sitting tolerance Joint instability Pain with movement, with weight-bearing, or with static postures
Adult	Excessive thoracic kyphosis Scoliosis Hyper-/hypolordosis Head-forward posture Altered shoulder girdle position Genu valgus/varus Excessive pronation/supination (foot) Chronically shortened muscles (e.g., pectoralis major, hip flexors)	Idiopathic spinal/extremity dysfunction Sports or musculoskeletal injury Repetitive strain disorders Occupational trauma Pelvic pain	Decreased range of motion Pain with movement, with weight bearing, or with static postures Vestibulitis Vaginismus Positional headache
Menopause	Excessive thoracic kyphosis–Dowager’s hump Hyper-/hypolordosis Head-forward posture Altered shoulder girdle position Genu valgus/varus Excessive pronation/supination (foot) Chronically shortened muscles (e.g., pectoralis major, hip flexors) Pes planus	Osteopenia Osteoporosis Idiopathic spinal or extremity dysfunction Sports or musculoskeletal injury Non-pathological urinary incontinence Balance problems	Decreased range of motion Pain with movement, with weight bearing, or with static postures Decreased exercise endurance Decreased balance Decreased range of motion

## Recommendations

1. Pelvic floor muscle training with a physiotherapist is recommended to prevent urinary incontinence during pregnancy and after delivery (I-A).
2. Core stability training with a physiotherapist is recommended to prevent and treat back and pelvic pain during and following pregnancy (I-B).

## ROLE OF PHYSIOTHERAPY IN THE MANAGEMENT OF OSTEOPOROSIS

Osteoporosis affects 1 in 4 women<sup>40,41</sup> and spinal compression fractures, proximal femur, distal radius, and rib fractures are the most common osteoporotic fractures.<sup>42–48</sup> Common consequences of the osteoporotic fractures include back pain, physical and functional impairment, reduced quality of life, and increased mortality.<sup>49–55</sup> Expected 5 year survival following hip or vertebral fracture is dramatically reduced.<sup>56</sup> Of particular relevance to posture, vertebral fractures can lead to an excessive thoracic kyphosis with restricted thoracic extension and height loss.

This often results in compensatory changes in head, neck, and lumbar position and shoulder range of motion.

Physiotherapy has an important role to play in a multidisciplinary approach to preventing and managing osteoporosis.<sup>57,58</sup> Physiotherapists use strength training, manual therapy, balance training, ergonomic advice, and postural reeducation in the treatment of osteoporosis.<sup>57–59</sup> Two main goals of physiotherapy exercise prescription for bone health are to build bone and prevent falls, as most osteoporotic fractures are fall-related. Randomized controlled trials suggest that exercise involving high impact loads positively influence skeletal bone mineral accrual in children<sup>60,61</sup> and the amount of bone mineral that most people lose during their entire life is similar to the amount of bone mineral being laid down during the adolescent years.<sup>62</sup> Studies in pre- and postmenopausal women suggest that certain types of exercise programs can provide superior maintenance of bone mass than a relatively sedentary lifestyle.<sup>63,64</sup> Exercises for preventing falls may be focused on muscle strength, balance, agility, and coordination. Strength

and agility training reduced fall risk factors in older women.<sup>65,66</sup>

**Recommendation**

3. Physiotherapist-prescribed exercises are recommended for women to elicit positive changes in bone mass and to reduce fall and fracture risk (I-A).

**ROLE OF PHYSIOTHERAPY IN THE TREATMENT OF URINARY INCONTINENCE**

Urinary incontinence has been associated with the institutionalized elderly; however, there is growing awareness that women may experience incontinence at any age. Stress incontinence has been documented in young female athletes<sup>67,68</sup> and in postpartum, peri-, and postmenopausal women. Urge incontinence is more prevalent in postmenopausal women.<sup>31</sup> A primary contributing factor to urinary incontinence in women is pelvic floor muscle weakness following childbirth.<sup>32,69</sup> Other factors can include a sedentary lifestyle, which can result in general deconditioning; occupations that involve repetitive or heavy lifting; obesity; chronic constipation; and chronic coughing—all of which, over time, weaken the pelvic floor muscles. The hormonal changes women experience during menopause can contribute to urinary and sexual dysfunction due to changes in the estrogen-dependant tissues of the urethra, bladder, and vagina.<sup>31</sup> Aging and deconditioning also contribute to weakened abdominal and pelvic floor muscles.

Pelvic floor muscle rehabilitation has been demonstrated to be effective in treating stress urinary incontinence and, if maintained, is effective over a 5-year period.<sup>70,71</sup> Pelvic floor muscle retraining with biofeedback for urge urinary incontinence is effective, but further research is needed.<sup>72</sup> Physiotherapy treatment includes education about bladder and bowel management and behavioural modification that decreases the symptoms of stress and urge incontinence.<sup>72-74</sup> Pelvic floor muscle retraining may decrease risk of early pelvic organ prolapse, as one of the functions of the pelvic floor muscles is to support the genital organs;<sup>75</sup> however, there is insufficient evidence to support this hypothesis at present.

Physiotherapy intervention for postoperative management of pelvic surgery has been demonstrated to be beneficial.<sup>76</sup>

**Recommendation**

4. Pelvic floor muscle training with a physiotherapist is recommended for women with stress urinary incontinence (I-A).

**CONCLUSION**

Posture is a dynamic state that affects all activities throughout a woman’s lifespan. There are physical, psychological,

and environmental factors that can influence posture, function, and ultimately quality of life. The earlier a woman adopts good postural habits, the more effectively she will be able to prevent or manage the impact of environmental and physical stress on her body.

Physiotherapists are “concerned with promoting health and well-being, preventing impairments, functional limitations and disabilities and providing interventions to restore integrity of body systems essential to movement and maximizing function.”<sup>77</sup>

As part of the health care team, physiotherapists play an important role in assessing and treating postural alignment and associated dysfunctions. Using a variety of interventions, physiotherapists can improve health and minimize disability through the prevention and management of injury and disease.

**Note**

Since this paper has been accepted there have been 2 new studies that further support these findings with regard to the postpartum population.<sup>78,79</sup> The Morkved et al. study<sup>30</sup> is well designed and demonstrates the positive effect of pelvic floor exercises with regards to urinary incontinence in nulliparous women during pregnancy and postpartum. The effects of pelvic floor exercises on urinary incontinence in women who are multiparous have yet to be determined.

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