Prevalence of neuropathic pain and pelvic floor disorders among females seeking physical therapy for chronic low back pain

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Abstract

Aims: Female patients often seek physical therapy (PT) for chronic low back pain (CLBP). This study aimed to evaluate the prevalence of pelvic floor disorder (PFD) and the association between PFD and neuropathic pain (NP) in a population of women referred to PT for CLBP, as these parameters are rarely investigated in this context.

Materials and Methods: This cross-sectional survey study included women aged 30–60 years who were referred to PT for CLBP. In addition to demographic and clinical information, the patients completed structured assessment questionnaires such as the validated Pelvic Floor Distress Inventory (PFDI-20), which was used to determine the prevalence of PFD, and the self-completed Leeds Assessment of Neuropathic Symptoms and Signs to differentiate nociceptive pain from NP.

Results: Among the 225 women included in the study, the mean body mass index was 31.6 ± 4.7 and the mean age was 46.7 ± 7.7 years (~79% were older than 40 years). The majority were not employed (i.e., homemakers), currently married, and sexually active. In addition, almost all had children (approximately 69% were grand multiparous), the majority of whom had been delivered through spontaneous vaginal delivery. Approximately 33% of women were postmenopausal and only 3% used hormone replacement therapy. Slightly more than half suffered from NP and approximately 43% experienced at least one PFD. Notably, patients with NP had significantly higher PFDI-20 overall and subscale scores, compared to those without NP.

Conclusions: Although PFD and NP are not routinely assessed in PT practice, both conditions are prevalent among and may interact in women with CLBP.

Keywords: Chronic low back pain, Neuropathic pain, Pelvic Floor Distress Inventory, pelvic floor dysfunctions, physical therapy

INTRODUCTION

Low back pain (LBP) is a major global health problem with a high prevalence and tendency to recur and/or become chronic.[1] Although the majority of patients with acute LBP recover rapidly and with minimal intervention, up to 80% report recurrent episodes and 10%–40% develop long-term

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or chronic LBP (CLBP; duration: ≥12 weeks).[1,2] These latter cases represent a major societal burden.[1]

In general, LBP is defined as pain and discomfort localized below the costal margin and above the inferior gluteal folds, with or without leg pain (sciatica).[3] Different dorsal structures can contribute to back and referred leg pain,[4] and pulmonary, urogenic, or gynecologic system disorders can stimulate sensory nerves supplied by the same spinal cord segments, resulting in referred back pain.[5] Particularly, gynecologic disorders can cause mid-pelvic or LBP and discomfort; for example, lumbopelvic pain is frequently attributed to pelvic floor muscle (PFM) dysfunction.[5] LBP is thought to involve two different pathophysiological mechanisms: tissue-injury (nociceptive) and nervous system-injury pain (neuropathic pain, [NP]),[6,7] the latter of which is attributed to a pathological change of function in a nerve.[8] In addition, NP is predominant in approximately a third of patients with CLBP.[9]

Most patients with back pain seek conservative treatments such as physical therapy (PT). Standard PT practices generally regard LBP as a structural or mechanical problem and employ various biomedical approaches to correct specific physical impairments.[10] Currently, most physical therapists receive biomedically orientated training and have limited exposure to biopsychosocial management models.[11] Despite these limitations, however, patients' beliefs and emotional and behavioral responses have been long recognized as important,[11] and almost all clinical guidelines for LBP management highlight psychosocial factors as potential risk factors for the transition from acute to chronic pain and disability.[12] In addition, an inadequate consideration of psychosocial factors within standard PT practice appears to influence the patient's responses to pain, treatment participation, and outcomes,[10] and psychological stressors (e.g., anxiety, depression, somatization) can increase the risk of LBP.[13]

In the Middle East, a significant association of anxiety and depression with LBP was observed in an Arab population,[13] and a case–control study of 62 participants in the Kingdom of Saudi Arabia (KSA) observed moderately elevated stress levels in patients with LBP relative to controls.[14] At present, Saudi patients require a referral for PT and many physical therapists manage patients entirely using biomedical models without addressing aspects such as NP or pelvic floor disorders (PFD). This is especially pertinent to the latter disorders, which may affect evacuation. For example, from a psychosomatic viewpoint, micturition is a hierarchically structured, neurophysiological regulatory circuit with a conscious motor component that can be influenced by both cognition and unconscious autonomic components. This socially regulated, emotionally charged learned behavior is considered intimate and associated with multiple effects, including embarrassment, pleasure, tension, and relief. Therefore, a failure to broadly approach the treatment of a PFD such as urinary incontinence (UI) may result in suboptimal management, a tremendous waste of resources, and emotional stress for both the patient and therapist, especially if the treatment outcome is poor.

At present, data are scarce regarding the prevalence of PFD and NP among women referred to PT for CLBP in the KSA. We hypothesize that classifying women with CLBP who are referred to PT according to the pain-generating mechanism and PFM integrity and subsequently matching these subgroups to favorable evidence-based management strategies might help to direct resource allocation and improve the quality of care, thus reducing associated costs. Accordingly, this study aimed to estimate the prevalence of NP and PFD and explore the association of these factors in a population of Saudi women referred to PT for CLBP.

MATERIALS AND METHODS

Study design and participants
Approval for this quantitative, cross-sectional study was granted by the appropriate ethics committee. A sample size of 323 participants was calculated by assuming a prevalence of 30% for both PFD and NP among women referred to PT because of CLBP, with a two-sided confidence limit of 5% and power level of 80%. The sample size was calculated using OpenEpi© software (version 2.2; AG Dean and KM Sullivan, Atlanta, GA, USA). As the recruitment of such a large sample was deemed infeasible because of the exclusion criteria, the study ultimately included 225 participants.

The participants were women who agreed to participate and met the following inclusion criteria: age between 30 and 60 years, ability to understand the Arabic language, and a referral to PT for CLBP (chronicity was defined as pain persisting for >3 months). The following exclusion criteria were also applied: a history of trauma, cancer, or spinal or pelvic floor surgical interventions; nighttime or resting pain; saddle anesthesia; unexplained weight loss; progressive or severe neurological deficits in the lower extremities;[4] deformities or structural abnormalities; pregnancy; morbid obesity (body mass index [BMI] ≥40); major psychiatric or cognitive problems; or fibromyalgia. All participants were given a consent form that explained the nature and objective of the study; the voluntary, anonymous, and confidential nature of participation; and the ability to

decline participation without any effect on PT treatment and care. Written informed consent was obtained from the noncompensated participants.

Procedure

The researcher contacted the Departments of Physiotherapy at four public hospitals in Riyadh. Explanations of the study were provided to physiotherapists at the outpatient clinics who agreed to collect data. After screening based on the inclusion and exclusion criteria, eligible referred patients were informed about the study and completed the personal data sheet and questionnaires after providing consent. For participants with no or little education, data were obtained by reading the questions to them and documenting their answers without explaining or elaborating on any item in the questionnaires.

Outcome measures

The participants' heights and weights were measured to calculate BMI and sociodemographic (age, nationality, educational level, occupation, and marital status) and gynecological data (sexual status, parity, delivery mode, menopausal status, and hormone replacement therapy [HRT] use) were obtained through history taking and medical records. The diagnosis, specialty of referring physician, numbers of times referred to PT and seen by a physical therapist for CLBP in the past 2 years, type of PT intervention, and treating therapist were obtained from the referral.

The standard Arabic language version of the Self-completed Leeds Assessment of Neuropathic Symptoms and Signs (S-LANSS) was used to distinguish patients with NP.[15] This validated survey comprises a pain questionnaire containing five symptom items (thermal sensation, autonomic changes, dysesthesia, paroxysmal pain, and evoked pain) and a sensory testing component assessing allodynia and altered pin-prick threshold and can be completed by patients without the aid of a health-care professional.[8] A cut-off score of ≥12 points indicates pain of predominantly neuropathic origin.

The patients' health-related quality of life was assessed using the Arabic language short form of the pelvic floor distress inventory (PFDI-20).[16,17] The PFDI-20 comprises 20 items divided into three subscales to evaluate distress related to pelvic organ prolapse (POP) and colorectal and urinary/bladder symptoms.[16] Since this study aimed to explore the prevalence of PFD in women referred to PT for CLBP, only the Arabic version of the PFDI-20 was used. Individual items were scored using a 4-point Likert scale: (1) "not at all;" (2) "somewhat;" (3) "moderately;"

and (4) "quite a bit." Each individual item and subscale score was calculated as the mean value of all answered questions multiplied by 25 (range: 25–100). The PFDI-20 summary scale was calculated as the sum of scores from the three subscales (range: 75–300). All scores were transformed to a 100-point scale for easier interpretation. A higher PFDI-20 score indicated a greater effect.

Statistical analysis

Patients' demographic, gynecologic, clinical variables, and coded individual question data from the PFDI-20 questionnaire are presented as frequencies/percentages for categorical variables and means ± standard deviations for continuous variables. The Mann–Whitney nonparametric test was used to evaluate the significance of the association between the PFDI-20 score and NP. General linear regression models were used to identify independent predictors of pelvic floor distress; demographic, gynecologic, and clinical characteristics were considered potential predictors and transformed PFDI-20 scores were considered outcomes. SPSS (version 22.0; IBM Corp., Armonk, NY, USA) was used for all statistical analyses. All P values were two-tailed and a value <0.05 was considered statistically significant.

RESULTS

Among the 563 women referred to PT for CLBP at the selected hospitals and recruited into the study, 338 were excluded [Supporting Table 1]. Accordingly, the 225 remaining patients were included in the analysis. The patients' demographic and gynecological characteristics are shown in Demographics are shown in supporting Table 2, gynecological and clinical characteristics are shown in Table 1, respectively. The patients had an average age of 46.7 ± 7.7 years and approximately 79% were at least 40 years of age. The mean BMI of the patient population was 31.6 ± 4.7; 66% and 22.5% were classified as obese (BMI ≥30) and overweight (BMI 25–29.99), respectively. Regarding education, approximately 44% of the patients had not completed secondary school, while 32% had completed college or higher. The majority (69%) did not work outside the home (i.e., homemakers), while the remainder mainly held teaching (16%) or administrative (7%) positions. Most (85%) patients were currently married; the remainder were single (6%) or divorced/widowed (9%). Approximately 87% of the married patients were sexually active (73% overall). Almost all patients (97%) had children and approximately 69% were grandmultiparous (≥5 live births). Spontaneous vaginal delivery (SVD) was the most frequent child delivery mode (69%), followed by combined SVD and C-section (25%) and C-section only (7%). Approximately

one-third (33%) of the patients were postmenopausal and only 3% used HRT.

The patients' clinical characteristics are also listed in Table 1. Here, 37% of the patients had an identifiable CLBP pathology, the most common of which was herniated discs (50%), followed by spondylolisthesis (21%) and disc degeneration (16%). Although the physicians' diagnoses in referrals were considered irrelevant as per the study

Table 1: Gynecological and clinical characteristics of women referred to physical therapy for chronic low back pain (*n*=225)

	n (%)
Gynecological characteristics	
Parity	
None	5 (2.4)
≤4	60 (28.4)
≥5	146 (69.2)
Type of childbirth	
Spontaneous vaginal delivery	139 (68.5)
C-section	14 (6.9)
Both	50 (24.6)
Menopausal status	
No	150 (66.7)
Yes	75 (33.3)
Sexual status	
Not active	60 (26.7)
Active	165 (73.3)
Use of hormone replacement therapy	
No	218 (96.9)
Yes	7 (3.1)
Clinical characteristics	
Chronic low back pain pathology mentioned	
No	141 (62.7)
Yes (*n*=84) 37.3%	
Herniated discs	42 (50.0)
Disc degeneration	13 (15.5)
Spondylolisthesis	18 (21.4)
Others	13 (15.5)
Specialty of referring physician	
General practice	41 (18.3)
Orthopedics	135 (60.5)
Neurosurgery/spine	39 (17.5)
Rheumatology	8 (3.6)
Times referred to physical therapy during the last 2 years	
First referral	76 (33.8)
2–6	119 (52.9)
>6	30 (13.3)
Times participated in physical therapy during the last 2 years	
First referral	81 (36.0)
2-6	125 (55.6)
>6	19 (8.4)
Received physical therapy	
No	78 (34.7)
Yes	147 (65.3)
Type of physical therapy	
Passive	37 (25.2)
Active	37 (25.2)
Combined	73 (49.7)
Neuropathic pain	
No	107 (47.6)
Yes	118 (52.4)

objectives, the majority of referring physicians specialized in orthopedics (61%), followed by neurosurgery/spine (18%) or general practice (16%). Furthermore, 66% and 64% of the patients had, respectively, received previous PT referrals and visited a PT clinic during the previous 2 years. Approximately 65% of the patients were undergoing PT; of them, half were receiving a combination of active and passive treatment. Approximately 52% of the patients met the criteria for NP, as defined by S-LANSS score ≥2.

The frequencies of individual PFDI-20 items are shown in Supporting Table 3. In the POP Distress Inventory (POPDI-6), the most frequently reported item was a sensation of pressure in the lower abdomen (59%), whereas the need to force the start or completion of urination was least frequently reported (4%). In the colorectal anal distress inventory (CRADI-8), a majority of patients reported needing to strain excessively to pass a bowel movement (67%) and a sensation of incomplete bowel emptying (60%), whereas only 7% reported having lost bowel control with well-formed stool. In the Urinary Distress Inventory (UDI-6), more than 60% of the patients reported experiencing four of the six items: frequent urination; urine leakage associated with a sense of urgency; urine leakage related to laughing, coughing, or sneezing; and lower abdominal or genital region pain or discomfort. For nearly all items, "somewhat" was the most frequently reported response, while "quite a bit" was the least frequently reported response.

The average individual PFDI-20 item, subscale, and summary scale scores are shown in Supporting Table 4. Of the three subscales, the UDI-6 score was highest (46.6/100 points), followed by the CRADI-8 (41.5/100 points) and POPDI-6 scores (40.9/100 points). The average overall
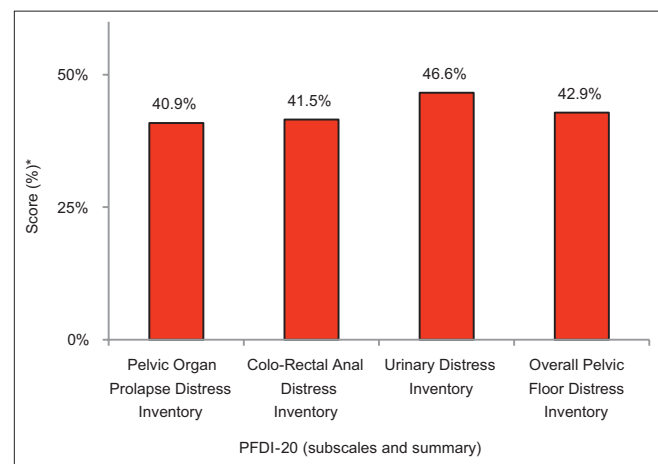

Figure 1: Pelvic Floor Distress Inventory-20* overall and subscale scores of women referred to physical therapy for chronic low back pain (*n* = 225). Data are derived from the scores in Supporting Table 4 after transformation to a 100-point scale

summary PFDI-20 score was 258.3/300 points and the transformed overall PFDI-20 summary score was 42.9/100 points [Figure 1]. Notably, patients with NP had significantly higher overall and subscale scores relative to those without NP, with values of 45.9 versus 39.5 ($P = 0.005$) for the overall PFDI-20, 44.4 versus 37.1 ($P < 0.001$) for POPDI-6, 43.6 versus 39.3 ($P = 0.022$) for CRADI-8, and 50.6 versus 42.2 ($P = 0.003$) for UDI-6 [Figure 2].

Potential demographic and clinical predictors of the overall PFDI-20 scores were subjected to a general linear regression model analysis adjusted for age, BMI, educational level, marital status, occupation, parity, delivery mode, menopause, use of HRT, sexual status, PT treatment, times seen at a PT clinic, and NP.
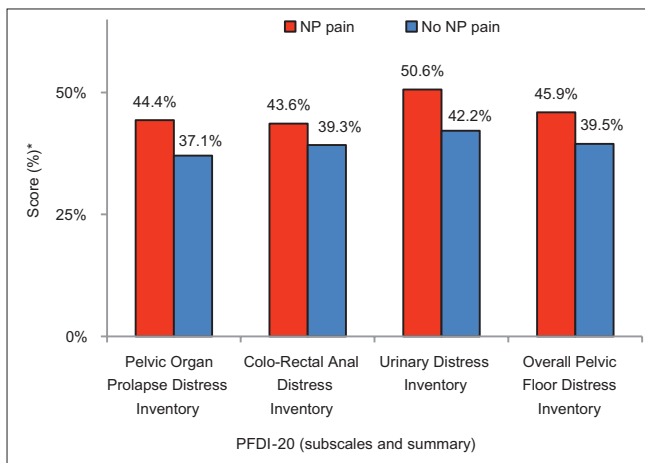
Notably, NP was the only patient characteristic found to associate significantly ($P < 0.001$) with greater pelvic floor distress in a multivariate analysis. The beta value, which indicates the excess distress associated with the presence of NP, was 5.85 points (standard error = 1.64) [Table 2 and Supporting Table 4]. Finally, Figure 3 compares the excess distress associated with the presence of NP before and after adjusting for the above demographic and clinical characteristics. The findings indicate that the excess pelvic floor distress associated with the presence of NP was not affected by any demographic or clinical characteristic.

DISCUSSION

Despite a reported association between LBP and PFD, the literature does not sufficiently describe the prevalence of

Figure 2: Pelvic Floor Distress Inventory-20 overall and subscale scores according to the presence or absence of neuropathic pain among women referred to physical therapy for chronic low back pain ($n = 225$). Data are derived from the scores shown in Supporting Table 4 after transformation to a 100-point scale. *P* values were calculated using the Mann–Whitney nonparametric test. As indicated, patients with neuropathic pain had significantly higher mean distress scores, compared to those without neuropathic pain
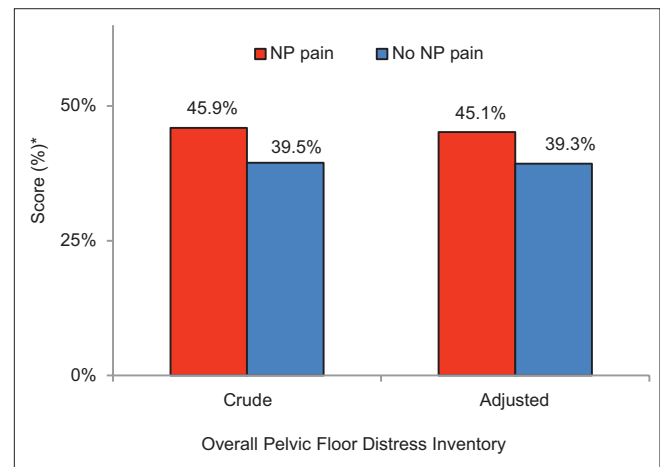

Figure 3: Pelvic Floor Distress Inventory-20 overall scores according to the presence or absence of neuropathic pain among women referred to physical therapy for chronic low back pain ($n = 225$). The analysis was adjusted for the demographic and clinical characteristics listed in Table 2. As indicated, the higher incidence of pelvic floor distress among patients with neuropathic pain was not affected by demographic or clinical characteristics

Table 2: General linear regression analysis of the demographic and clinical predictors of overall Pelvic Floor Distress Inventory-20 scores among women referred to physical therapy for chronic low back pain (*n*=200)

Parameter	β	SE	95% CI		*t*-test	*P*
			Lower bound	Upper bound		
Age	−0.02	0.16	−0.34	0.30	0.13	0.899
BMI	−0.11	0.18	−0.46	0.25	0.59	0.556
Neuropathic pain	5.85	1.64	2.62	9.09	−3.57	<0.001
Educational level (college or higher)	−2.02	2.31	−6.58	2.54	0.87	0.383
Marital status (married)	5.70	3.53	−1.27	12.66	−1.61	0.108
Occupation (working)	1.19	2.31	−3.37	5.74	−0.51	0.608
Parity (≥5)	−0.11	1.91	−3.87	3.66	0.06	0.956
Childbirth (C-section)	−2.086	3.19	−8.379	4.207	0.785	0.514
Childbirth (both spontaneous vaginal delivery and C-section)	−1.679	1.922	−5.471	2.113	0.874	0.383
Menopause	−1.70	2.23	−6.10	2.70	0.76	0.448
Use of hormone replacement therapy	3.18	4.47	−5.65	12.00	−0.71	0.479
Sexual status (active)	−4.29	2.56	−9.34	0.76	1.68	0.096
Physical therapy treatment	−1.20	5.67	−12.38	9.98	0.21	0.832
Times seen at physical therapy (≥2)	3.33	5.66	−7.83	14.48	−0.59	0.557

BMI: Body mass index, CI: Confidence interval, SE: Standard error

PFD among the general Saudi population. Saudi women and men are equally likely to have undergone periodic health examinations within the last 2 years (22.4% vs. 23.3%);[18] however, given the conservative cultural background, Saudi women may consider PFD as insufficiently problematic to require medical intervention or may be reluctant to consult male physicians.[19] Therefore, this study is the first to evaluate the prevalence and association of NP and PFD among Saudi women referred to PT for CLBP.

Notably, NP was the only patient characteristic that associated significantly with PFD in this study, and nearly 52% of included patients exhibited NP, consistent with similar previous studies.[7] Still, no study had previously investigated the association between these conditions, although potential explanations have been suggested, of which the most convincing one suggests that chronic pain causes brain plasticity and maladaptive changes. Furthermore, approximately half of the present study participants experienced at least one PFD; the prevalence of UI (>60%), the most common disorder, was higher than that reported in a general Saudi population (27.4%–36.4%) but lower than that among 200 Swedish women referred to PT for LBP (78%).[19,20] These differences may be attributable to several factors, including interstudy differences in the patients' ages, inclusion/exclusion criteria, and data collection methods.

Several risk factors for PFD development have been identified, including advanced age.[21,22] In our study, age may not have associated with PFD because 66.2% of our participants were aged 31–50 years. Notably, other studies concluded that approximately 40% of women aged 60–79 years and 53% of women aged ≥80 years suffer from at least one symptomatic PFD.[22,23] A higher BMI has also been associated with a higher prevalence of PFD. Obesity has previously been linked to UI, fecal incontinence (FI) and POP, and weight loss and bariatric surgery have been reported to improve UI and reduce the prevalence of FI; however, weight loss may not improve bothersome prolapse symptoms.[23] In the KSA, 33.5% of Saudi women are obese, while 28.0% are overweight;[18] by contrast, 66% and 22.5% of our patients were obese and overweight, respectively. Still, we observed no association between obesity and PFD, consistent with previous findings.[19] Parity is also considered a risk factor for PFD. Memon and Handa concluded that primiparous women had a threefold higher prevalence of SUI relative to age-matched nulliparous controls and the risk of SUI surgery increases with increased parity.[22] However, Al-Badr *et al*. observed a higher prevalence of UI among nulliparous Saudi women (37.5%), compared to women with 1–2 (27.5%) or 3–4 pregnancies (34.2%).[19]

Although the child delivery mode has been suggested as a potential risk factor, reports of the impact of this factor on the prevalence of PFD are conflicting. British researchers suggested that pudendal nerve stretching and compression during labor could cause denervation of the PFMs and thus promote PFD.[22] Pudendal nerve stretching and compression caused by fetal head engagement have been reported during 38%–42% of vaginal deliveries.[24] In a retrospective cohort study of parous women, women who had experienced at least one SVD had a twofold risk of bothersome symptoms of SUI compared with women who delivered exclusively through C-section, and the risk of surgical intervention for SUI was threefold higher and 20-fold higher among women who had SVD and those who experienced forceps-assisted delivery, respectively, than among women who gave birth exclusively through C-section.[22] Furthermore, vaginal childbirth, particularly operative vaginal delivery, increased the risk of pelvic organ descent to or beyond the hymen and Stage 2 POP was noted in 18% of Spanish primiparous women who delivered vaginally versus 7% of women who had a C-section at 6-month postpartum.[22]

Similarly, the role of parity on the prevalence of FI remains uncertain. Although 2%–16% of vaginal deliveries are complicated by direct trauma and laceration of the anal sphincter,[22] studies have shown that a third- or fourth-degree anal sphincter tear and instrumented delivery consistently increased the risk of postpartum FI.[23] Such injury, therefore, contributes to the development of FI, even if repaired.[22] Furthermore, Saudi women have a mean of 7 children,[25] consistent with the grand multiparous status of majority of participants in the present study (69%). Despite the high level of parity and frequency of SVD, neither factor associated with PFD in our study. This somewhat confusing finding may be attributable to improvements in the KSA health-care system, and consequently, the health status of Saudi citizens as reflected by the decreased maternal mortality and increased life expectancy among women.[18]

This study had some limitations of note. For example, the required sample size was not recruited and assessments were based on symptoms rather than urodynamics or anorectal manometry. Furthermore, data regarding operative vaginal delivery (forceps or vacuum), degree of obstetrical injuries, or history of episiotomy were not obtained, although these factors may influence the risk of PFD.

CONCLUSIONS

CLBP is a complex problem involving both biomedical and psychosocial factors. Therefore, PTs must take a

holistic, biopsychosocial approach to patient assessment, which may involve the inclusion of questions regarding PFD and NP in history-taking forms. Changes in the PT management of CLBP might improve management utilization and outcomes while reducing complications. In addition, the apparent interaction between NP and PFD among women referred to PT for CLBP requires further evaluation, as these factors are not generally evaluated in clinical PT settings.

Conflicts of interest
There are no conflicts of interest.

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