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PAIN DISTRIBUTION PATTERN IN GLUTEAL-RELATED LOW BACK PAIN: A PROPOSED PATHO-ANATOMICAL APPROACH USING GLUTEAL TRIANGLE

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ABSTRACT

Purpose: Different assessment strategies for radiating low back pain (LBP) abound across and within primary-contact disciplines yet physical diagnosis of the involved faulty anatomical structures remain difficult. This study investigated pattern of pain distribution in patients with gluteal-related low back pain. **Methods:** The study involved forty (40) participants with radiating low back pain who were referred for physiotherapy from two major referral clinical settings in Ghana. They were recruited into the cross-sectional survey through consecutive sampling technique. Using marker and transparent tracing sheet, gluteal triangle was outlined from the lumbar region, the involved gluteal region and the posterior part of the involved thigh. Pattern of pain distribution was noted and physically correlated with stereotype patterns of pressure points as gold standard. Data analysis involved mean, frequency distribution, percentage distributions and z-score. Alpha value was considered significant at $p < 0.05$. **Results:** The mean ages, year (SD) were 52.0 years (12.0) and 48 years (15) for male and female, respectively. Myofascial and piriformis syndromes were the most predominant presentations among the patients recording 13 (32.5%) and 10 (25%), respectively. Male group recorded 9 (22.5%) of pain originating from myofascial syndrome compared to 4 (10%) assessed in their female counterparts. There was no gender difference in the proportion of pattern of pain distribution among the

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participants. **Conclusion:** This study demonstrated different patterns of pain distribution and was found to be consistent with gold standard pressure point in the assessment of patients with radiating LBP, thus it can be included as complimentary diagnostic tool in clinical practice.

Keywords: Gluteal-related low back pain; Gluteal triangle; Patho-anatomical assessment approach.

INTRODUCTION

Low back pain (LBP) presents a major health concern globally in terms of enormous economic and social costs.[8] Approximately 10%–20% of patients with LBP will develop chronic LBP, defined as pain and disability persisting for more than three months.[9] LBP has been described as the most prevalent musculoskeletal disorder accounting for the most common and fastest growing reasons for work loss, health care expenditure and disability benefits.[1]

Radiating LBP is a common complaint among many individuals. Gluteal pain is a common co-morbid presentation of LBP and it may originate either from the dysfunctions of neural components or musculoskeletal structures.[3] Gluteal-related LBP presents clinicians in physiotherapy and orthopedics with huge task during objective assessment in clinical practice. Identifying faulty anatomical structures causing low back dysfunctions in order to administer a match intervention has been highlighted as a priority in research.[10] In spite of the vast assessment methods available, practitioners are still confronted with many diagnostic dilemmas with respect to radiating LBP.[3] The complex anatomical structures of the lumbar spine, the gluteal region and the pelvis explain the similarity in clinical presentations thereby making differential diagnostic difficult. In view of the self-limiting nature of mechanical LBP, appropriate assessment procedure is required to ascertain its accurate diagnosis so as to reduce burden on both the patients and the health care professionals.

Several studies have proposed varying methods in the assessment of radiating LBP, including formulation of prediction rule in classifying patients with LBP who are likely to benefit from spinal manipulation, patterns of lumbar region movement to classify patients with LBP into sub-groups, evaluation of LBP using discriminant validity construct of treatment-based classification, classification of low back-related leg pain and repeated movement tests.[2,4,6,7,10] Despite these documentations, accurate physical diagnosis of radiating LBP still remain enigmatic.

Gluteal triangle emanates from selected anatomical reference points which define three dimensional nature of the proximal lower extremity pathology that forms a diagnostic triangle for assessing gluteal-related back pain.[5] The assessment principle is premised on the location of symptoms of the surrounding tissues relative to gluteal triangle landmarks and borders. A closely related pain pattern distribution model was reported by Steindler using stereotype patterns of pressure point to delineate precise soft tissue involvement in LBP syndrome.[11] Although gluteal triangle has been applied successfully among athletes, its application in clinical setting as an assessment tool has not been documented. We envisaged that the inclusion of this assessment method will provide a complimentary approach for physiotherapists in clinical practice, thus saving health care resources and preventing suffering among patients with radiating LBP. The present study was designed to determine the pattern of pain distribution among patients with gluteal-related LBP who were referred for physiotherapy at two referral clinical settings in Accra, Ghana.

MATERIALS AND METHODS

Participants

The cross-sectional survey involved 40 patients with a chronic gluteal-related LBP of mechanical aetiology as primarily diagnosed and referred for physiotherapy at Korle-Bu Teaching Hospital (KBTH) and 37 Military Hospital Accra, Ghana. They were recruited into the study through consecutive sampling technique. Inclusion criteria demands that the pain has lasted for a period of three months and it must be gluteal related-back pain of mechanical origin. Exclusion criteria as screened by the orthopaedic specialist in conjunction with a senior physiotherapist, were the signs of serious pathology and those with localized LBP.

Materials for Data Collection

(a) Meter Rule: A plastic meter rule (30 cm long) with linear calibration in centimeter was used to draw the borders of the gluteal triangle using the anatomical landmarks as reference points.

(b) Tracing sheet: A transparent tracing sheet was used for outlining the gluteal triangle by placing it to cover the lumbar region, gluteal region and the posterior thigh of the affected lower limb where radiating pain was being experienced.

(c) Marker: A whiteboard non-permanent marker was used in outlining the borders of the gluteal triangle on the tracing sheet.

Procedures

Ethical committee of the School of Allied Health Sciences gave approval for this study (Ref. No: SAHS/022007018) prior to its execution. The written informed consents of the participants were sought and obtained after which they were provided with a pictorial diagram of the gluteal triangle in order to appreciate the protocols involved in the study.

Measurements were taken in standing position with the participants' lower back, the involved gluteal region and the thigh moderately exposed leaving the underwear in place. The spinous process of fifth lumbar vertebra (L5), the greater trochanter and ischial tuberosity were palpated and located in standing position. Owing to the obscurity of the ischial tuberosity in the gluteal muscles, participants were required to actively flex the hip of the involved lower limb (to about 60°) so that the assessor could locate the bone at the level of the gluteal fold.

The tracing sheet was placed and firmly secured with adhesive plaster on the participant's body to cover the lumbar region, gluteal region and the posterior aspect of the involved thigh. Using a meter rule and a marker, a straight line was drawn to connect the spinous process of L5 to the greater trochanter to form the superior border of the gluteal triangle. Another line was drawn from spinous process of L5 through the ischial tuberosity to a point at posterior aspect of the involved thigh. This line was noted as medial border of the gluteal triangle. The third line was drawn from the greater trochanter along the thigh to the posterior aspect of the thigh to form the lateral border of the triangle. The point of intersection between the lateral and medial borders forms the inferior apex of the gluteal triangle known as 3G [Figs. 1(a) and 1(b)]. The relationship of the 3G (gluteal, groin and the greater trochanter) with L5 is such that its location at the posterior coronal plane is twice the distance between the spinous process of L5 and gluteal tuberosity.

The distribution of radiating pain at the gluteal region and posterior thigh with respect to the gluteal triangle was recorded. The method adopted in this study described the protocols

(a) **(b)**

Fig. 1 **(a)** Outlining the borders, **(b)** a complete outline of gluteal triangle showing medial, lateral and superior borders (green arrows).

used by Franklyn-Miller *et al.* and it was correlated with Steindler stereotype pressure point.[5,11] This was presented as follows:

(a) Pain at the superior border of the triangle was indicative of myofascial pain. This correlates with the localized tenderness, lateral to the posterior inferior spine with the radiation down the posterior part of the thigh along the sacrospinallis muscle and its fascia. The condition is documented to be due to strain or injury along the line of origin of the gluteus maximus.[11]

(b) Pain felt at medial border was indicative of sacroiliac joint dysfunction and obturator nerve entrapment.[5] This describes sacrospinalis syndrome which produces a pressure point at the posterior superior or inferior ilac spine within the sacral triangle.

(c) Pain observed at the lateral border was suggestive of lateral cutaneous nerve entrapment which corresponds with the Tensor fascia lata syndrome with the tender point located at the lateral border of the fascia and ilio tibia band at the posterior superior iliac spine extending to trochanter.

(d) The pain distributed within the triangle was largely due to piriformis syndrome. This correlates with transversosacral syndrome caused by arthritis or ligamentus strain in which tenderness is felt directly over the transversosacral joint with radiation down the posterior thigh.

The observed patterns of pain distribution among the sample participants were noted and these were recorded by the researchers for descriptive presentation.

Data Analysis

Data were analyzed using the Statistical Package for Social Sciences (SPSS) version 16. Descriptive statistics of mean, frequency distribution and percentage distributions were used to present the data collected. z-score was used to compare the proportions of pain distribution between male and female. Alpha value was considered significant at $p < 0.05$.

RESULTS

Physical Characteristics of the Participants

The sample in this study comprised 40 patients who presented with unilateral gluteal-related LBP; 23 (57.5%) of the participants were females. The mean ages, year (SD), were 52.0 years (12.0) and 48 years (15) for male and female, respectively.

Pattern of Pain Distribution Among the Participants

Pain arising from myofascial and piriformis syndromes was observed as the most common presentations among the patients recording 13 (32.5%) and 10 (25%) cases, respectively. Obturator nerve entrapment and lateral cutaneous nerve pain were the least observed pain syndrome accounting for 4 (10%) and 5 (12.5%), respectively, as shown in Table 1.

Patterns of Pain Distribution Between Male and Female Participants

Comparative presentations of the pattern of pain distribution between male and female patients were presented in Fig. 2. Male group recorded 9 (22.5%) cases of pain originating from myofascial syndrome compared to 4 (10%) assessed in their female counterparts. By contrast, the female participants recorded 8 (20%) cases of pain originating from piriformis syndrome as against 2 (5%) in the male group.

Table 1 Pattern of Gluteal-Related Pain Among the Participants.

Pain Pattern	Number of Cases	Percentage (%)
Sacroiliac joint pain	8	20.0
Obturator nerve entrapment pain	4	10.0
Myofascial pain	13	32.5
Lateral cutaneous pain	5	12.5
Piriformis syndrome pain	10	25.0
Total	40	100

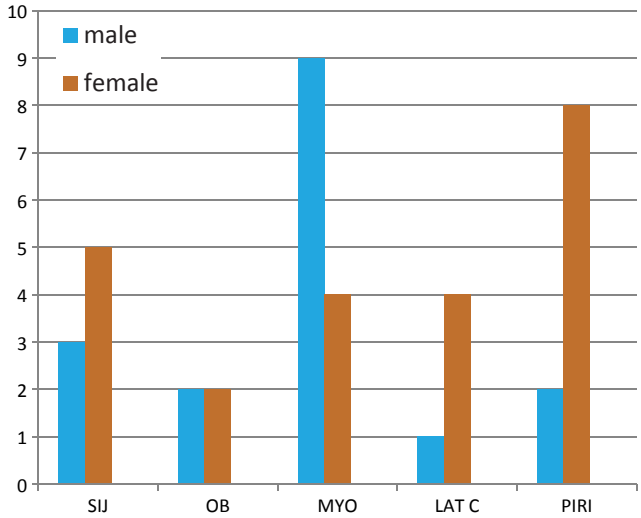

Fig. 2 Comparison of pattern of pain distribution on gender basis.
Key: SIJ = Sacroiliac joint pain; OB = Obturator nerve entrapment pain; MYO = Myofascial pain; LAT C = Lateral cutaneous nerve pain; PIRI = Piriformis syndrome pain.

Comparisons of the patterns of pain distribution in all the presentations of the LBP using z-score test showed no significant differences ($p > 0.05$) in the symtomatic presentations between male and female patients (Table 2).

DISCUSSION

The presentations of radiating LBP, sacro iliac joint dysfunction and pelvic pathologies are similar thus causing a formidable challenge to differentiate the causative anatomical structures. Missed physical diagnosis of radiating LBP may explain the persistent signs and symptoms normally observed in most patients as wrong intervention is likely to be administered.[3] Precise identification of faulty tissue eliciting pain should precede intervention in clinical practice. This

Table 2 Comparison of the Pattern of Pain Distribution Between Male and Female Patients.

Pattern of Pain Distribution	Male (%)	Female (%)	*z*-Score	*p*-Value
Sacroiliac joint pain	7.5	12.5	0.24	0.81
Myofascial pain syndrome	5.0	5.0	−0.56	0.58
Lateral cutaneous nerve pain	22.5	10.0	0.35	0.74
Piriformis pain syndrome	2.5	10.0	0.72	0.47

cross-sectional survey forms parts of the series to establish a complimentary technique in the assessment of people with radiating chronic LBP.

The outcome of this study showed a variation of pattern of pain distribution of radiating LBP which follows the anatomical pathways of the involved structures in conformity with reports of Steindler.[11] Most sampled participants who presented with radiating LBP actually have their pain originating from myofascial pain syndrome (32.5%). Although no study is available with which to compare the present finding, other authors have reported sacroiliac joint dysfunction as a major pain source in an estimated 15% to 25% of patients with LBP.[12] Another study is thus required to confirm the findings of the present study. Though patho-anatomical assessment approach in differentiating diagnosis among patients with radiating LBP has raised many questions, gluteal triangle describes a simple and discernible means of differentiating selected faulty tissues in assessing patients with radiating LBP.[5]

Comparisons of the patterns of pain distribution between male and female participants showed no significant differences. This indicates that tissue involvements in radiating LBP has no bearing on gender difference.

In conclusion, the use of gluteal triangle has established differential involvements of faulty anatomical structures in gluteal-related LBP. This finding lends credence to the established pattern of pressure point. Thus, patho-anatomical approach can therefore be included in the assessment tool by physiotherapists in clinical practice.

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