# Allodynia and Dysmenorrhea

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## Abstract

**Objective:** Cutaneous allodynia (pain from a non-painful stimulus) is a sign that can be observed among women with chronic pelvic pain. Dysmenorrhea is recognized as a common cause of chronic pelvic pain in women. This study was conducted to explore the frequency of allodynia and the relationship between allodynia and severe dysmenorrhea.

**Methods:** We enrolled women in this study if they had experienced chronic pelvic pain for more than six months. Women provided information regarding their chronic pelvic pain and menstrual function, specifically the severity of their menstrual pain. In addition to a gynaecological assessment, women were tested for allodynia and pain pressure thresholds.

**Results:** Abdominal allodynia was present in 62.1% of 181 women who participated. Women with allodynia had a significantly greater rate of severe dysmenorrhea and significantly greater duration of severe dysmenorrhea. Pain pressure thresholds were demonstrated to decrease significantly in relation to increasing duration of severe dysmenorrhea.

**Conclusion:** There is a greater frequency of chronic pain among women with a history of severe dysmenorrhea. Women who experienced prolonged severe dysmenorrhea were shown to have a progressive increase in pain sensitivity (reflected in reduced pain pressure thresholds). These findings support efforts to manage dysmenorrhea early in a woman's life with approaches to suppress menstrual function.

## Résumé

**Objectif :** L'allodynie cutanée (douleur provoquée par un stimulus non douloureux) est un symptôme qui peut être constaté chez les femmes qui connaissent des douleurs pelviennes chroniques. La dysménorrhée est reconnue comme étant une cause courante de douleur pelvienne chronique chez les femmes. Cette étude avait pour but d'explorer la fréquence de l'allodynie et la relation entre cette dernière et la dysménorrhée grave.

**Méthodes :** Les femmes admises à cette étude connaissaient des douleurs chroniques depuis plus de six mois. Ces femmes nous ont fourni des renseignements au sujet de leurs douleurs chroniques et de leur fonction menstruelle, particulièrement en ce qui concerne la gravité de leurs douleurs menstruelles. En plus de se soumettre à une évaluation gynécologique, ces femmes ont fait l'objet de tests visant à déterminer l'allodynie et les seuils de douleur à la pression.

**Résultats :** Une allodynie abdominale était présente chez 62,1 % des 181 femmes qui ont participé à l'étude. Les femmes connaissant une allodynie présentaient un taux significativement accru de dysménorrhée grave; de plus, la durée de cette dernière était significativement accrue chez ces femmes. Nous avons constaté que plus la durée de la dysménorrhée grave augmentait, plus les seuils de douleur à la pression connaissaient une baisse significative.

**Conclusion :** Une fréquence accrue de douleur chronique est constatée chez les femmes qui présentent des antécédents de dysménorrhée grave. Nous avons constaté que les femmes qui connaissaient une dysménorrhée grave prolongée présentaient une hausse progressive de leur sensibilité à la douleur (révélée par la baisse des seuils de douleur à la pression). Ces constatations soutiennent les efforts visant la prise en charge précoce de la dysménorrhée au moyen d'approches qui cherchent à supprimer la fonction menstruelle.



**Key Words:** Pelvic pain, dysmenorrhea, allodynia, sensitization

Conflicting interests: None reported.

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## INTRODUCTION

Allodynia is the presence of pain as a result of a non-painful stimulus.[1,2] The first description of cutaneous allodynia due to visceral disease was reported by Head in 1893.[3] The so-called "Head zones" were the basis for the recognition of dermatomes. In 1913, Mackenzie described a case of biliary colic using a figure that demonstrated allodynia in the right upper quadrant. Within this area of allodynia was a "tender area that was associated with a twig of the 9th thoracic nerve."[4] This astute observation made more than 100 years ago is the basis for some contemporary clinical pain testing, described in the following.

Allodynia has been used as a marker for the presence of visceral disease; we have demonstrated that it is 10 times more likely to be associated with prior or existing visceral pelvic disease than with somatic disease (OR 10.41; 95% CI 2.72 to 39.79).[5] Testing for allodynia has been validated by

test-and-retest with blinded observers.[6] Allodynia has been shown to be the most significant clinical test in the prediction of postoperative pain after surgery performed for non-acute pain.[7] Demonstrating allodynia predicted a better pain outcome (i.e., less pain) after surgery, presumably because the pain focus in the pelvis had been removed.[8]

The specific objectives of this study were to describe the clinical findings among a cohort of women with chronic pelvic pain, establish the association of allodynia with the important clinical conditions of dysmenorrhea and endometriosis, and encourage implementation of the test for allodynia in the evaluation of gynaecological pain.

## METHODS

We reviewed the records of 181 women who were part of a convenience sample of women with chronic pelvic pain. These women were evaluated by a single gynaecologist with a practice directed to the assessment and management of chronic pelvic pain.

Women referred with chronic pelvic pain for more than six months were eligible for entry into the study cohort. We excluded pregnant women from the study but made no exclusions based on prior surgery or medical management. Participants initially completed a questionnaire to describe in detail their prior clinical history of clinical diagnoses, prior surgery, and the nature of their pain. A research nurse described the study to potential participants, answered any questions, and obtained written consent to participate. In addition to the descriptions of pain (sporadic, intermittent, or continuous) that generated the referral, we recorded details of participants' menstrual pain (none, mild, moderate, or severe) and for how many years it had been present. The gynaecological examination was supplemented with tests for allodynia and pain pressure sensitivity.[5] Allodynia was identified by the presence of a sudden change in sensation or pain as a cotton-tipped applicator was drawn slowly down the mid-clavicular line from mid-thorax towards the os pubis.[9] Allodynia on the perineum was identified by drawing a cotton-tipped applicator medially across the perineum toward the anal region on both sides and inferiorly from the upper labia majora towards the anal region (in the S3 dermatome, although the area of allodynia can also extend out towards the knees in the S4 dermatome[10]). Pain pressure sensitivity was detected using a pressure algometer with a 1 $cm^2$ flat probe that allows a woman to discontinue the pressure immediately at the onset of pain while the pressure is recorded in kPasc.[11] These measures were taken in the shoulder and the right and left lower quadrants over tender areas, as described by MacKenzie.[4]

The clinical presentations of the women were evaluated in terms of the presence or absence of allodynia.[1,2,10,12] The continuous data were compared using the Student $t$ test, and data not normally distributed were analyzed with non-parametric statistical analysis. Significance was accepted at $P < 0.05$. Previous studies have shown a rate of allodynia in a population of women with chronic pelvic pain to be 67%; a sample size of 184 had sufficient statistical power (0.87) to detect a difference of 58% and 42% in the rate of allodynia between the groups.[5]

Approval for the study was provided by the Ethics Committee of the University of Calgary.

## RESULTS

A total of 184 women were approached, and 181 agreed to participate in the study. One woman refused to participate, and in two other cases informed consent was not obtained. Among the 181 participants, the mean age (± standard deviation) was 35.5 ± 10.9 years, age of menarche was 12.9 ± 1.8 years, the duration of presenting pain was 7.4 ± 8.5 years, the rate of dyspareunia was 81.1% ± 39.3%, and the rate of severe dysmenorrhea was 76.9% ± 42.2%. The overall rate of continuous pain was 57.9% ± 49.6%.

For these women, the rates of allodynia were 62.1% on the abdomen (n = 153) and 39.5% on the perineum (n = 152). This rate is in agreement with a previous report from our unit of a group of 81 women with chronic pelvic pain who had a frequency of allodynia of 66%.[5]

The most common areas of allodynia were in the T12 and L1 regions. However, the pattern can be diverse, as indicated in Figure 1. In a small number of cases, allodynia is provoked by pressure on the lower abdomen in the region of the T12 and L1 nerves where they emerge from the rectus fascia, as first described by Mackenzie.[4]

There was no difference between women with and without allodynia in terms of age, gravidity, parity, age at menarche, or the duration or severity of the pain on presentation (Table). However, there was a significant difference between the groups in the frequency and duration of severe dysmenorrhea: 89% of 77 women tested for and found to have allodynia reported having severe dysmenorrhea for an average of 12 years. This contrasted with the finding that 63% of 43 women tested for and found not to have allodynia reported having had severe dysmenorrhea for an average duration of seven years ($P < 0.05$) (Table). The presence of allodynia was significantly associated with having more frequent dyspareunia ($P = 0.03$) and continuous pain ($P = 0.002$) (Table).