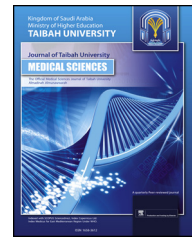




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Original Article

## Is age of menarche related to urinary symptoms in young Jordanian girls? A prospective cross-sectional study

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### المخلص

**أهداف البحث:** هناك ارتفاع في معدل انتشار سلس البول، خصوصاً عند السيدات، في جميع أنحاء العالم. افترضت هذه الدراسة أن العمر عند بداية الحيض، كنقطة نمو، قد يكون عامل خطورة لحدوث سلس البول.

**طرق البحث:** أجريت هذه الدراسة المستقبلية المستعرضة على الفتيات اللاتي حضرن إلى العيادة الخارجية للأمراض النسائية في مستشفى الملك عبد الله الجامعي، في الأردن خلال العام ٢٠١٣-٢٠١٤. وقد تم جمع التاريخ الطبي والبيانات الديموغرافية، وتم دراسة الصلة بين بداية الحيض والمشاكل البولية.

**النتائج:** تضمنت الدراسة ٣٦٠ فتاة (متوسط العمر: ١٧.٦ ± ٤.٠١ عاماً). وأفادت ١٠١ مشاركة (٢٨.٩٪) أنهن يعانين من الحاجة الملحة للتبول؛ و ٢٣ (٦.٦٪) من سلس البول؛ و ١٧ (٤.٩٪) منهن استخدمن الفوط البولية في الليل؛ و ٢٣ (٦.٦٪) لديهن عدوى بولية متكررة؛ وتلقى ٦١ (١٢.٣٪) علاجاً لسلس البول، و ٤٣ (١٢.٣٪) تم علاجهن لالتهابات المسالك البولية. كما تم تسجيل كثرة التبول أثناء الليل بشكل ملحوظ في الفتيات الأصغر سناً عند دورتهن الأولى. وارتبطت مشاكل البول الأخرى أثناء الحيض مثل الحاجة الملحة للتبول بشكل كبير بزيادة العمر عند الدورة الأولى.

**الاستنتاجات:** يمثل العمر عند بداية الحيض مؤشراً خطراً مهماً لنشوء سلس البول لاحقاً عند النساء.

**الكلمات المفتاحية:** سلس البول؛ العمر عند بداية الحيض؛ سلس البول الليلي؛ الحيض

### Abstract

**Objectives:** Urinary incontinence (UI) is highly prevalent worldwide, especially in women. This study hypothesized that the age of menarche, a developmental landmark, may be a risk factor for the development of UI.

**Methods:** This prospective, cross-sectional study was conducted on girls presenting to the gynaecology outpatient clinic at King Abdullah University Hospital, Jordan, from 2013 to 2014. Medical history and demographic data were collected, and associations between age of menarche and urinary problems were examined.

**Results:** The study enrolled 360 girls (mean age 17.60 ± 4.01 years). Of the participants, 101 (28.9%) reported experiencing urgency in urination, 23 (6.6%) had UI, 17 (4.9%) reported using urine pads at night, 23 (6.6%) had recurrent urinary infections, 61 (12.3%) had received treatment for UI, and 43 (12.3%) had been treated for urinary infections. Nocturia was significantly more frequently reported in younger girls at their first period ( $p = 0.02$ ). Other urinary problems during menstruation, such as urge incontinence, were significantly associated with older age at first period ( $p = 0.05$ ).

**Conclusion:** Age of menarche represents an important risk indicator for later development of UI in women.

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**Keywords:** Age of menarche; Menstruation; Nocturnal enuresis; Urinary incontinence

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## Introduction

Urinary incontinence (UI) affects millions of people worldwide, with varying severity and nature. The International Continence Society defines UI as ‘the complaint of any involuntary leakage of urine’.<sup>1</sup> Incontinence may present either as involuntary urine leakage accompanied by a sudden urge to urinate immediately, known as urge UI or overactive bladder, or as the loss of a few drops of urine involuntarily, for example while running or coughing, known as stress UI. Although UI is not a life-threatening condition, severe incontinence can be debilitating. It inhibits social engagement owing to fear of public embarrassment and is a main cause of emotional distress.<sup>2–4</sup>

A study on pre-menopausal women found that self-reported UI was associated with current hormone use for menstrual disorders (odds ratio [OR] 2.7, 95% confidence interval [CI] 1.2–6.6), a recent decrease in bleeding duration (OR 2.2, 95% CI 1.3–3.7), and being on days 11–15 before the expected end of the menstrual cycle at the time of UI (OR 2.6, 95% CI 1.3–5.0).<sup>6</sup> However, another study found only limited evidence for variations in the incidence of UI during the menstrual cycle.<sup>7</sup>

Nocturia, on the other hand, is a common symptom that is defined as waking up at night to void, where each micturition is preceded and followed by sleep.<sup>5</sup> Although, by definition, even a single episode of awakening to urinate is considered nocturia, epidemiological evidence and expert clinical opinions suggest that nocturia is likely to be clinically meaningful if a patient voids 2 or more times in a night.<sup>6</sup> The prevalence of nocturia is higher with increasing age.<sup>12,22–25</sup> Occasional nocturia is present in 50% of men and women aged 50–59 years. Among 18–49 year olds, more women than men have nocturia; the sex ratio reverses after 60 years of age, with the prevalence being greater in men than in women.<sup>22</sup>

Nocturnal enuresis (NE; synonymous with intermittent nocturnal incontinence) refers to discrete episodes of UI during sleep in children  $\geq 5$  years of age, which is the population we aimed to analyse in our study.

Nocturia and NE are associated with increased rates of depression<sup>15</sup> and work absenteeism,<sup>16</sup> lower self-rated physical and mental health,<sup>17</sup> congestive heart failure,<sup>18</sup> and increased all-cause mortality.<sup>19</sup>

Menarche, on the other hand, is a developmental landmark that identifies the first time the process of menstruation occurs within a woman. This marks the ‘official’ onset of puberty. For example, early onset of menarche (i.e. before age 12 years) was found to be associated with short stature and obesity, increased risk of cardiovascular disease, type II diabetes, hypertension, and various types of cancer including

breast and ovarian cancers.<sup>17–19,31–33</sup> Late onset of menarche (i.e. after age 16 years) is associated with osteoporosis, depression, and social anxiety disorder in the later years of life.<sup>20</sup> The landmarks of pubertal events in girls are the onset of puberty, peak height velocity (PHV), and menarche.

Adolescents experience several types of maturation, including cognitive (development of formal operational thought), psychosocial (stages of adolescence), and physical. This complex series of physical transitions is known as puberty, and these changes may influence psychosocial factors. The onset of puberty is marked by the development of breast tissue, whereas PHV is the highest velocity observed during the pubertal growth spurt.

Numerous studies (Table 1) have examined the secular trend of age at menarche in various populations. In general, there is a continuous trend of younger ages at menarche in most parts of the 20th century, although this trend has tended to slow down or stabilize. In the United States, the mean age of menarche was  $>14$  years before 1900<sup>22</sup>; it decreased to 12.43 years in a study conducted between 1988 and 1994,<sup>23</sup> although there were significant racial differences between these 2 maturational timings.

Socioeconomic factors or life settings, such as urban/rural residency, family size, family income, and level of parental education, may also influence pubertal development. Girls from families with a high socioeconomic status experience menarche at an earlier age than girls from families with lower socioeconomic status.<sup>35</sup> Furthermore, higher parental education has been associated with earlier timing of puberty.<sup>35</sup> The improvements in socioeconomic conditions that took place in the 20th century resulted in an earlier onset of puberty in children, indicated by the decrease of age of menarche. However, reports from developed countries have suggested that this trend has been levelling off. Furthermore, girls born in 3rd-world countries who are adopted by parents from developed countries experience early menarche.

We came across a study that tested the hypothesis that different levels of endogenous oestrogen alter fluid regulation and urine production. This study was designed to enrol participants in the mid-follicular phase (oestrogen low) and just before the estimated time of ovulation (oestrogen high). The follicular phase was selected, as the concentration of progesterone remains low in normal healthy subjects during this phase.

The study found that hormones involved in diurnal urine regulation were unaffected by the oestradiol level.<sup>36</sup> An influence of high and low levels of oestrogen was observed on diurnal urine.<sup>8</sup>

**Table 1: Patient characteristics.**

Characteristics	Mean $\pm$ SD
Age (years)	17.6 $\pm$ 4.00
Weight (kg)	56.57 $\pm$ 12.01
Height (cm)	159/48 $\pm$ 6.26
Age at first menarche (years)	12.94 $\pm$ 1.56
Age at urine control, day (years)	2.64 $\pm$ 2.358
Age at urine control, night (years)	2.93 $\pm$ 2.22

SD, standard deviation.

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