



12-1-2002

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#### Recommended Citation

Wong, Alice M. K.; Pei, Yu-Cheng; Huang, Pin-Pin; Cheng, Hung-Wei; Chou, Shi-Wei; and Li, Chia-Yin (2002) "Urinary Incontinence in Young Female Athletes of Taiwan," *Rehabilitation Practice and Science*: Vol. 30: Iss. 4, Article 1.

DOI: <https://doi.org/10.6315/3005-3846.2172>

Available at: <https://rps.researchcommons.org/journal/vol30/iss4/1>

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# Urinary Incontinence in Young Female Athletes of Taiwan

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# Urinary Incontinence in Young Female Athletes of Taiwan

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To determine whether women participated in sport, even these young nulliparous female athletes, are more prone to have urinary incontinence in Taiwan. Four hundred and forty- six young female students were included in this study. All of them were nulliparous. Our subjects consisted of 260 varsity athletes, 106 athletes of high school, and 80 varsity non-athletes. They were requested to complete questionnaires on the type of major sport, intensity of training, menstrual history, sport injury, and urinary incontinence. The results showed that the athletes group had a greater body height and weight and a higher prevalence of urinary incontinence (10.0% in varsity athletes, 15% in high school athletes, and 5% in varsity non athletes) than the non-athlete group.

The varsity athlete group revealed a significantly delayed menarche than their high-school counterpart ( $13.0 \pm 1.3$  yrs vs  $12.6 \pm 1.2$  yrs). Among the high school athletes, daily training intensities were longer in the incontinence group than the continence group ( $p < 0.01$ ). The prevalence of urinary incontinence was 12% in high impact athletes, and 6.3% in low impact athletes. Among them, the prevalence of incontinence was 62.5% in handball, 25.0% in judo and tennis, 14.6% in badminton, 10% in track & field, 9.1% in football and weight-lifting, 7.1% in basketball, 6.7% in softball, 5.4% in volleyball, 3.0% in Taekwondo and 33.3% in swimming. Among all athletes, only one athlete went to the clinic for management, none had informed their coaches about the incontinence.

In this study, we found that young nulliparous athletes, who participated in regular and stressful sports, had a higher incidence of urinary incontinence than the non-athletes. Further studies are necessary in making adequate clinical diagnosis and to advice strategies to prevent urinary incontinence in young female athletes. (J Rehab Med Assoc ROC 2002; 30(4): 201 - 206 )

**Key words:** urinary incontinence, young female athletes, sport-related incontinence

## INTRODUCTION

Historically, women played a limited role in the participation of sport. Even in the 1920s, male gyneco-

gists still believed that when a woman makes a vigorous jump, her uterus may even tilt backwards. Each attempt to train the muscles of the female abdomen and pelvis may lead to tautening of the muscle fibers, making childbirth more difficult. However, a group of German female

Submitted date: 13 August 2002.

Revised date: 31 October 2002.

Accepted date: 12 November 2002.

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physician interviewed and examined 10,000 woman athletes in 1934, for 120 scientific publications on women's sports, no resulting the preservations about women's competitive sport.<sup>[1]</sup>

Over the last 25 years, researches have shown that the training response of the female athlete is similar to their male counterpart, with minor exceptions due to the hormonal factors. Women have been shown superior to men on tasks involving fine motor coordination and speed of motor programming, whereas men out perform women on target-directed motor skills. The success of the United States 1996 gymnastics team, which won the Gold Medal in the Atlanta Olympics, raised questions about the pressure on young athletes to perform in spite of injury.

The female athlete triad (eating disorders, amenorrhea and osteoporosis) and urinary incontinence, which are usually regarded as a problem affecting older multiparous women, has been reported in female Olympians as well as in nulliparous young athletes of high school.<sup>[2-6]</sup> Activities such as jumping, high-impact landings, and running are most likely to provoke incontinence during exercise than rest. Twenty-eight percent of nulliparous college varsity athletes reported episodic urinary incontinence while performing their sports. The proportions of incontinence in female athletes varied in different sports, with 67% in gymnastics, 66% in basketball, 50% in tennis, 29% in field track, 10 % in swimming, but none in golf player. There are no statistically significant relations to incontinence with amenorrhea, body weight, hormone therapy, or duration of athletic activity of these young female athletes. In contrast, there is no report of urinary incontinence in male athletes.<sup>[5]</sup>

Since these young female students experienced urinary incontinence they have none of the conventional risk factors for incontinence, such as old age, vaginal parity, or postmenopausal status, we conducted a descriptive questionnaire study to the young athletes in high school and college students in Taiwan to investigate the prevalence of urinary incontinence, based on the increased biomechanical forces and intensities of sport training.

## MATERIALS AND METHODS

The young female athletes in high school and col-

lege were asked to complete a questionnaire about the prevalence of urinary incontinence while participating in their sport, as well as during activities of daily life. The control groups of young varsity female students were from departments of physical therapy, occupational therapy and nursing. They were also active and in good fit status. Subjects having a history of major injury of pelvic floor or lower abdomen, urological surgery, gynecological surgery, spinal cord injury, herniated intervertebral disc, or radiculopathy were excluded from this study.

The questionnaire focused on the kind of major sport, intensity of training, menstrual history, sports injury, and urinary incontinence. If a subject participated in more than one kind of sports, only the major one was recorded. Questions were specified to elicit the self-report of urinary incontinence, to categorize the frequency and severity of each symptom.

## Data analysis

The differences among the athlete and control groups, and differences in parameters between athletes with and without urine incontinence were analyzed using Chi-Square and Fisher's exact tests for categorical variables, while one-way ANOVAs and Student's t test were employed for continuous variables. Turkey's tests were applied for post-hoc comparisons after ANOVA analysis. The level of statistical significance was set as  $p < 0.05$ .

## RESULTS

In this study, 605 questionnaires were issued, and a total of 446 young female students completed the questionnaire. Among them, 260 were varsity athletes, 106 were high school athletes and 80 were varsity non-athletes. All of them were nulliparous. The athlete group had greater body height and body weight, and higher prevalence of urinary incontinence (10% in varsity athletes, 15% in high school athletes, and 5.0% in varsity non-athletes) than the non-athlete group (Table 1). The varsity athlete group revealed a significantly delayed menarche than the high-school athlete group ( $13.0 \pm 1.3$  yrs vs  $12.6 \pm 1.2$  yrs).

However, there was no significant difference in age, body height, body weight, body mass index, and menarche in the female varsity athletes with or without

Table 1. Geographic data of young female varsity athletes and non-athletes

	(a)Varsity Athlete (n=260)	(b) High school Athlete (n=106)	(c) Varsity Non-Athletes (n=80)	p	comparison
Age (years)	20.1±2.4	16.3±1.3	20.2±0.9	<0.01	ab, bc
Body height (cm)	165.6±7.8	166.3±7.6	159.8±4.8	<0.01	ac, bc
Body weight (kg)	60.3±9.6	59.1±8.3	53.2±8.5	<0.01	ac, bc
BMI	21.9±2.7	21.3±2.1	20.8±3.0	<0.05	ac
Menarche (years)	13.0±1.3	12.6±1.2	12.7±1.2	<0.05	ab
Incontinence	26(10%)	16 (15%)	4 (5.0%)	0.08	

BMI: body mass index

urinary incontinence. There was no difference in average started training age with urinary incontinence as compared with the continence group.

There was also no significant difference between the urinary incontinence and continence group in medical history, including regularity of menstruation, prevalence of amenorrhea, medication for menstruation regulation, sports injury and cystitis. Daily training hours (hours per week) and training frequencies (days per week) demonstrated no significant difference between the urinary incontinence and continence groups. Among the high school athletes, daily training intensities were longer in the incontinence group than the continence group ( $p<0.01$ ), but not significant in varsity athletes ( $p>0.05$ ).

The prevalence of urinary incontinence was 12% in high impact athletes, 6.3% in low impact athletes ( $p=0.56$ ). The prevalence of incontinence was 62.5% in handball, 25.0% in Judo and tennis, 14.6% in badminton, 10% in track of field, 9.1 % in football and weight-lifting, 7.1% in basketball, 6.7% in softball, 3.0 % in Taekwondo, and 33.3 % in swimming, respectively (Table 2).

On the frequency of urinary incontinence, 83.3 % of athletes with urinary incontinence had less than one episode per week, and 4.8 % had several episodes per week. As for the severity of urinary incontinence, most of them (85.7 %) had incontinence only during running, heavy lifting, coughing, sneezing or laughing, and only 2.4% just during standing, walking, or stair climbing. About the effects of urinary incontinence on sport performance, 46.7% had urinary incontinence during sport

training, and 4.8% during the game. Besides, 38.1% complained of urinary incontinence during daily living.

Among athletes with urinary incontinence, 78 % of them paid no attention about incontinence. As for the management of incontinence, 31% wore sanitary pad, and 11.9 % performed Kegel exercise for pelvic muscle strengthening, while 47.6 % did not take action at all. Only one out of all athletes went to the clinic for her incontinence. None had discussed the event of incontinence with her coach. Only 10% informed their parents about the incontinence. However, 66.7% of them were willing to tell their teammates or school nurses about the incontinence.

## DISCUSSION

This study demonstrates that even the young, nulli-parous, and highly physically fit women in Taiwan are liable to have urinary incontinence. Both athletic and non-athletic female varsity students had certain percentage of urinary incontinence. However, the prevalence of urinary incontinence in high school and varsity athletes of this study were relatively much lower than those in the American study (17 % in junior school, 40 % in high school), although most of them started to receive sport training since in primary school.<sup>[5]</sup> One may ask why the incidence of urinary incontinence in athletes is lower in Taiwan than in other countries. We postulate it is due to the racial differences in body composition and connective tissue properties related to the pathogenesis of urinary

Table 2. Prevalence of urinary incontinence in high impact and low impact athletes

Type of sport	Total No.	Incontinence No.	Incontinence (%)
High impact	<b>333</b>	<b>40</b>	<b>12.0</b>
Handball	16	10	62.5
Judo	8	2	25.0
Tennis	8	2	25.0
Badminton	82	12	14.6
Track and Field	10	1	10.0
Football	11	1	9.1
Basketball	113	8	7.1
Softball	15	1	6.7
Volleyball	37	2	5.4
Taekwondo	33	1	3.0
Low impact	<b>32</b>	<b>2</b>	<b>6.3</b>
Swimming	3	1	33.3
Table tennis	8	0	0
Weight lifting	11	1	9.1
Archery	10	0	0
Others	1	0	0
Total	<b>366</b>	<b>42</b>	<b>11.8</b>

incontinence. Besides, the training intensity may be lower in Taiwan and results in a lower incidence of urine incontinence.

Bø et al compared the prevalence of incontinence between students majoring in physical education and nutrition, but no significant difference was found despite physical education were trained more than three times per week while most of the nutrition students were sedentary.<sup>[6]</sup> In this study, the prevalence of incontinence between female physical education students and medical allied varsity students did not reach statistically significance different, either.

Factors involved in the transient failure of an athlete's continence may include inadequate abdominal pressure transmission, pelvic floor muscle fatigue, and changes in connective tissue or collagen. In this study, athletes with incontinence reported urine loss during daily activities as well as during sport training. Some of them experienced urinary incontinence under stress as well.

Other studies reported the highest prevalence of urinary incontinence in the gymnasts (67%) due to the

changes in collagen concentration.<sup>[5]</sup> The athletes with hypermobility syndrome (ligamentous laxity) are often assigned for gymnastic training. However, there was no gymnastic athlete included in current investigation. In this study, the prevalence of incontinence was higher in handball, swimming, Judo and tennis, badminton, track & field, football and weight lifting. Also, athletes under greater training intensities demonstrated a higher incidence of incontinence. Why these types of sports manifest in the incidence of urinary incontinence? We speculate that the dynamic impact derived from repetitive running, jumping, with concurrent elevation of intra-abdominal pressure, and deceleration of pelvic floor muscle during training with a high intensity will ensue. These findings were compatible with the Ntgaard's work.<sup>[7]</sup>

Another study conducted by Al-Rawi, dealing with genital prolapse and properties of connective tissue, found that women with hypermobility syndrome demonstrated 66% of genital prolapse than 18% of the control.<sup>[8]</sup> A woman with hypermobility syndrome may be selec-

tively encouraged to do gymnastics. Since they were predisposed to incontinence, gymnastics revealed the highest incidence. Since no gymnast was involved in this study, further investigation will be necessary to include these subjects and to develop strategies for better control of urinary incontinence.

In this study, more than half of the young female discussed their incontinence condition with their teammates. However, only one went to the clinic for help. No subject is willing to tell her coach. Only 10% of them discussed their urinary incontinence with their family member. Traditional generation gap in Taiwan society may be a contributing factor for this condition. Hence, coaches should pay closer attention for their female athletes in the prevention and management of urinary incontinence. Team physician should develop a non-invasive evaluation protocol of urinary incontinence in young female since they may refuse to go to a urological or sports clinic.

Further study should focus on the etiology of incontinence and investigate whether it is a result from a transient or permanent insult to the female athletes. Other interests of investigation can focus on how impact forces are transmitted to the pelvic floor, what is the therapeutic effect of load-dampening orthosis or shock-absorbing shoes, whether Kegel exercise works for these subjects, and etc. It is also warranted to make adequate clinical diagnosis and to devise relevant strategies to manage urinary incontinence and retard its progression in these active young female athletes.

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## 年青女性運動員尿失禁探討

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本研究目的在於探討我國年輕女學生，參與運動訓練後是否會較有機會發生尿失禁。本研究用問卷方式調查 446 位高中及大專女學生關於其運動種類、運動強度、月經問題、運動傷害及尿失禁發生狀況作分析比較。所有女學生均為未婚及未有生產經驗。其中 260 名為大專運動員，106 名為高中運動員，80 名為則為普通大學女學生。結果發現運動員組之身高、體重均優於非運動員組。在大專組中，運動員之初經來潮年齡明顯比高中組運動員延遲(13.0±1.3 歲比 12.6±1.2 歲)。運動員組有較高比例發生尿失禁(大專女運動員 10%，高中女運動員 15%，大專非運動員僅 5%)。在高中生運動員中，尿失禁組其每日訓練運動強度是明顯高於非尿失禁組(p<0.01)。其中高衝擊性運動組尿失禁發生率為 12%，低衝擊性運動組則僅 6.3%。發生率最高依次為手球 62.5%，游泳 33.3%，網球及柔道 25%，羽球 14.6%，田徑 10%，足球及舉重 9.1%，籃球 7.1%，壘球 6.7%，排球 5.4%，及跆拳道 3%，值得注意的是沒有一位女學生會將尿失禁的情形告訴教練。只有一位願意到醫院求診。如何發展出非侵襲性檢查作正確診斷及處置則是日後重要課題。(中華復健醫誌 2002; 30(4): 201 - 206)

**關鍵詞：**尿失禁(urinary incontinence)，年輕女運動員(young female athletes)，  
運動相關尿失禁(sport-related incontinence)