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URINARY INCONTINENCE AMONG ATHLETES

Diana POPOVA-DOBREVA[1]

Abstract: *We have present a definition of urinary incontinence and the main types of incontinence as an introduction to the present study. The world medical database MEDLINE was researched using the following keywords: incontinence and athletes. The publications we have found have been analyzed and commented by topics. The main themes of interests of the researchers on urinary incontinence among athletes are listed.We have commented separately both the number of publications on incontinence and on athletes, as well as the number of publications covering both themes. The year of the first publication related to urinary incontinence, the year of the first paper related to the matter among athletes and the first publication combining both topics are pointed out. We have drawn basic conclusions on the ground of the analysis we have made. The presence of urinary incontinence among athletes is not sufficiently studied. There are very few researches on this matter. Anyway, the interest in that theme has been increasing during the recent years. However, the depth of the problem is still far from being achieved. Further studies are needed.*

Keywords: *urinary incontinence, athletes.*

1. Introduction

The ability to control urination depends on having normal anatomy, a normally functioning nervous system, and the ability to recognize and respond to the urge to urinate.

By definition, any involuntary loss of urine is determined as incontinence. It can range from an occasional leakage of urine, to a complete inability to hold any urine.

The three main types of urinary incontinence are:

Stress incontinence - occurs during certain activities like coughing, sneezing, laughing, or exercise.

Urge incontinence - involves a strong, sudden need to urinate followed by instant bladder contraction and involuntary loss of urine. You don't have enough time from the moment you realize the need to urinate and when you actually do urinate.

Mixed incontinence - involves more than one type of urinary incontinence.

There are other types of incontinence too.

[1] Vassil Levski" National Sports Academy, Sofia, Bulgaria.

2. Problems

Women are more likely than men to have urinary incontinence. Distribution of incontinence increases with age. Prevalence of incontinence varies depending on age, gender, race, BMI and used definitions of incontinence. Amaro JL et al. (2009) has reported the distribution of urinary incontinence among Brazilian women over 20 years of 27%. Martínez Agulló E et al. (2009) has examined prevalence of urinary incontinence and hyperactive bladder in the Spanish population. The authors has established prevalence of over active bladder and/or urinary incontinence in Spain to be nearly 10% among women between the age of 25 and 64, around 5% in men between 50 and 64 years and it more than 50% in persons over 65 years. Nygaard I, (2009) has studied of prevalence of symptomatic pelvic floor disorders in US women. The results showed that 15.7% of women experience urinary incontinence. The proportion of women reporting at least 1 disorder increased incrementally with age, ranging from 9.7% in women between the ages of 20 and 39 years to 49.7% in those aged 80 or older, and parity 12.8%, 18.4%, 24.6% , and 32.4% for 0, 1, 2, and 3 or more deliveries, respectively.

Problems with the loss of urine can be caused by the following major reasons: anatomic problems; brain or nerve problems; nerve and muscle disorders (neuromuscular disorders); dementia or other psychological problems that affect the ability to recognize and respond to the urge to urinate.

Pregnancy and childbirth are associated with weakening of pelvic floor muscles. This weakness creates condition for the occurrence of incontinence.

Systematic continuous physical exercise can also induce the occurrence of incontinence. This fact caused our scientific interest. In this study, its objective is to review the publications associated with incontinence of urine in athletes. We did study in the medical date base MEDLINE with keywords: incontinence and athletes. We found 22 titles. Fig. 1 presents the numbers of publications on topics related to incontinence of urine and athletes separately and the number of publications concerning both topics.

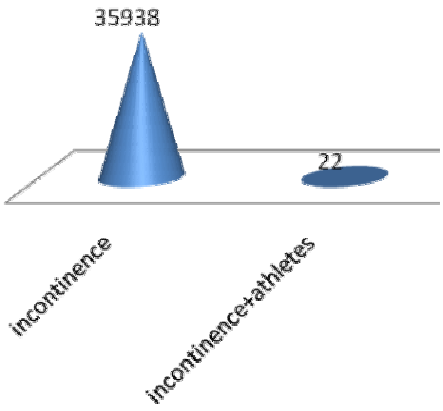

Fig.1. *Number of publications on topics in* MEDLINE

Number of items associated with urinary incontinence are 35938 and the number of surveys of athletes is 17790. Only 22 publications commented on incontinence of urine in athletes.This result shows poor understanding of the incontinence of urine problem in athletes.

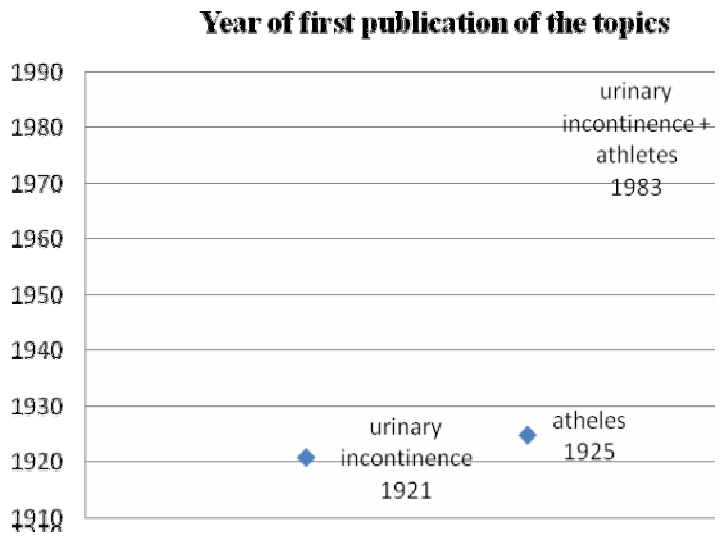

Fig. 2. *Years of first publications on urinary incontinence, athletes and urinary incontinence in athletes*

The first publications on topics related to urinary incontinence and athletes are found in the year 1921 and 1925 respectively. The first article concerning the problem of urinary incontinence in athletes was published nearly sixty years later.

Most studies are aimed at establishing the prevalence of urinary incontinence in athletes. Thyssen HH et al. (2002) has investigated the frequency of urinary loss in elite women athletes and dancers. The study involved 291 elite athletes in eight different sports, including ballet. The women filled an evaluated questionnaire about urinary incontinence while participating in their sport/dancing and during daily life activities. The average age of women was 22.8 years. Overall, 151 women (51.9%) experienced urine loss, 125 (43%) while participating in their sport and 123 (42%) during daily life. The proportion of urinary leakage in the different sports was: gymnastics 56%, ballet 43%, aerobics 40%, badminton 31%, volleyball 30%, athletics 25%, handball 21% and basketball 17%. Women indicated that the activities most likely to cause a leak had been jumping. The authors concluded that urinary leakage was common among elite athletes and dancers, particularly during training, but also during daily life activities.

Caylet N et al. has studied prevalence and occurrence of stress urinary incontinence in elite women athletes. They used an anonymous self-questionnaire.The women aged 18 to 35 years. The experimental group was composed of elite female athletes and the control group - of women in the same age range. A total of 157 answers from elite athletes and 426 from control subjects were available for analysis. Urinary incontinence prevalence was 28% for athletes and 9.8% for control subjects. There was no significant difference in the relative prevalence of stress urinary incontinence between the athletes and control subjects. Athletes reported urine loss more frequently during the second part of the training session, and

the second part of competition. Urinary incontinence prevalence was 9.87% in physically-active control subjects versus 9.84% in sedentary control subjects. The authors have concluded that there is a very high prevalence of urinary incontinence in women athletes. They recommended detailed studies of the patho-physiology of this problem to be performed.

Similar study was carried out earlier by Bø K, Borgen JS (2001). The authors set several goals: to examine the prevalence of stress and urge incontinence in female elite athletes and controls; to check association between urge and stress incontinence and eating disorders, and to assess a possible association between stress and urge incontinence and menstrual irregularity. The study included a screening part by questionnaire and a clinical interview. Questions included in the questionnaire were related to training history, menstrual history, eating behavior, and stress and urge incontinence. The total population of female elite athletes, defined as one representing the national team for junior or senior (N = 660), and age-matched nonathlete controls (N = 765) aged 15-39 were asked to answer the questionnaire. As opposed to previous research cited there was no significant difference in prevalence of stress urinary incontinence (SUI) in the athletes and controls, 41% and 39%, respectively. No significant difference was observed between sport groups. No difference in the frequency of urge incontinence was found when athletes (16%) and controls (19%) had been compared. The authors made the conclusion that there was a high prevalence of stress and urge incontinence in female elite athletes.

The prevalence of urinary incontinence was investigated by Carls C (2007). The author has studied high school and college-age female athletes. They used a modified Bristol Female Lower Urinary Tract Symptoms Questionnaire. Carls C found that more than 25% of those which had completed surveys experienced incontinence. Unfortunately, 90% had never told anyone about their problem and had no knowledge of preventive measures. Quality of life is affected in 16% of those with incontinence.

Such a study was done by Nygaard IE et al. (1994). The purpose of the study has been to determine the prevalence of the symptom of urinary incontinence during athletic endeavors among a group of nulliparous, elite college varsity female athletes. Questionnaires had been used about the occurrence of urinary incontinence while participating in their sport and during activities of daily life. The study involved one hundred forty-four female athletes. All women were nulliparous and the mean age was 19.9 years. Overall, 40 athletes (28%) reported urine loss while participating in their sport. The proportions in different sports was: gymnastics 67%, basketball 66%, tennis 50%, field hockey 42%, track 29%, swimming 10%, volleyball 9%, softball 6%, and golf 0%. The authors found that there was no statistically significant relations between incontinence and amenorrhea, weight, hormonal therapy, or duration of athletic activity. Activities most likely to provoke incontinence included jumping, high-impact landings, and running. Forty percent and 17% of the women first noted incontinence during their sport while in high school and junior high school, respectively. The authors has concluded that incontinence during physical stresses was common in young, highly fit, nulliparous women. According to them this suggests that there was a continence threshold which, when exceeded, can result in urine loss, even in the absence of known risk factors for incontinence.

The pelvic floor function in elite nulliparous athletes was studied by Kruger JA (2007). The aim of this study was to further characterize pelvic floor muscle function and pelvic organ descent in a nulliparous athletic population and compare it with non-athletic controls matched for age and body mass index, using three-dimensional/four-dimensional (3D/4D) pelvic floor ultrasound imaging. Tthe study of Kruger JA (2007) involved 46 nulliparous female volunteers (aged 19-39 years), 24 HIFIT (high-impact, frequent intense training) and 22 controls. Specific tests were conducted with two-dimensional (2D) and 3D translabial ultrasonography. The authors reasoned that high-impact, frequent intense training athletes showed significant differences in some of the controlled parameters to the function and anatomy of the pelvic floor.

As mentioned above, vigorous exercises may cause incontinence. More likely it is to be stress-incontinence. Bø K. (2004) supposed that stress urinary incontinence was a barrier to women's participation in sport and fitness activities and, therefore, it may be a threat to women's health, self-esteem and well-being. The author conducted systematic literature review on urinary incontinence and participation in sport and fitness activities with a special emphasis on prevalence and treatment in female elite athletes. There had been no randomised controlled trials or reports on the effect of any treatment for stress urinary incontinence in female elite athletes. Bø K. accepted that strength training of the pelvic floor muscles had shown to be effective in treating stress urinary incontinence in parous females in the general population. Performed literature analysis show that in randomised controlled trials, reported cure rates varied between 44% and 69%. The author esteemed that the pelvic floor muscles need to be much stronger in elite athletes than in other women. According to her there was a need for more basic research on pelvic floor muscle function during physical activity and the effect of pelvic floor muscle training in female elite athletes.

Some of the publications dealt with urinary incontinence as one of gynecological problems in women athletes (Shade AR (1983); Broso R, Subrizi R. (1996); Warren MP, Shantha S. (2000); Prather H (2000)). Greydanus et al. (2002)).

Broso R., Subrizi R. (1996) has expressed extreme position that urinary incontinence during physical stresses was common in young nulliparous women. The essential in the article, according us, is the authors' opinion that perineo-sphincter exercise must be started very early during the post-partum, before the start of sports. Our opinion is that this is the way to prevent incidents of urinary incontinence and prolapse of the vagina.

According Warren M.P., Shantha S. (2000) high impact sports activities may produce urinary incontinence. The authors has discussed other problems related to women's sports. These had been the presence of menstrual disturbances, changes in hormonal balance, the female athletic triad. The author considered that athletes of low weight was at risk of developing the female athletic triad, which includes amenorrhoea, osteoporosis and disordered eating. Athletes with this triad had been susceptible to stress fractures.

Zhang Y. et al. (2009) has conducted a study that demonstrates the feasibility of using computer modeling approach to study female stress urinary incontinence during physical and daily activities. Through a series of computer simulations, the effects of varying impact forces determined by jumping height and bladder volume had been investigated. The dynamic computer simulation results had

revealed that jumping heights have a significant influence on the volume of urine leakage caused by the landing impact of jumping. Bladder volume did not have a significant influence on leakage when the jumping heights were smaller than 1 ft, which indicates that normal walking (corresponds to a jumping height smaller than 0.1 ft) is not the primary cause of urine leakage for healthy females. The study contributes to improving the understanding on the mechanisms of stress urinary incontinence in females.

Amaro JL et al. (2009) has studied the relationship between urinary incontinence and eating disorders in female long-distance runners. Purpose of the study was to determine the prevalence of urinary incontinence in female long-distance runners and to compare it with the presence or not of eating disorders. The authors has used International Consultation on Incontinence Questionnaire-Short Form (ICIQ-SF) and the short version of the Eating Attitudes Test (EAT-26). To determine urine loss had performed a one-hour pad test. The study involved 37 women. Twenty-three athletes (62.2%) reported urine loss. Research carried out shows that there was urinary incontinence in female long-distance runners and a correlation with eating disorders.

Bø K., Backe-Hansen KL. (2007) has compared the prevalence of low back, pelvic girdle and pelvic floor complaints during and after pregnancy in athletes and controls. The study involved 40 elite athletes who had given birth registered with The Norwegian Olympic Committee and Confederation of Sports. Authors has estimated that there was no significant differences in the prevalence of urinary incontinence among elite athletes and controls at any time point. Bø K concluded that there was no differences in mode of delivery or birthweight between elite athletes and controls and the elite athletes had a significantly lower body mass index at 6 weeks postpartum compared with the control group.

Nygaard IE (1997) and Bø K, Sundgot-Borgen J (2008) has conducted important researchs that uncovered the relationship between urinary incontinence and intensive physical activity.

Bø K, Sundgot-Borgen J. (2008) has aimed to investigate whether former female elite athletes are more likely to experience urinary incontinence (UI) later in life than non-athletes and to assess possible risk factors for UI in athletes. Three hundred and thirty-one former elite athletes and 640 controls responded to mailed questionnaires. Survey results show that while competing in sport, 10.9% of the former elite athletes reported stress urinary incontinence. The percentage of those who reported urge incontinence is 2.7%. During the examination 36.5% of the former elite athletes and 36.9% of the controls reported stress urinary incontinence. For urge incontinence rates was 9.1% and 9.4%, respectively. Among former athletes, urinary incontinence was more common in women with vs those without urinary incontinence while competing. From here it follows that urinary incontinence early in life, as reported during elite sport, was a strong predictor of urinary incontinence later in life. The main conclusion of the study was that the prevalence of urinary incontinence does not seem to be higher in former athletes than in controls. As mentioned above the study has been conducted via postal questionnaire. The response rate was 81%. We note that this is significantly higher rate of response compared to the results of our similar research. This is probably due to better discipline and responsibility of the Norwegians in comparison with the Bulgarians.

Nygaard IE.(1997 has studied whether women engaged in strenuous, provocative exercise are more likely to be incontinent in future life than similarly fit women who participated in less provocative exercise. The author has compared two groups of athletes who had completed a structured questionnaire. American women participating in the Olympic Games between 1960 and 1972 were grouped by type of sport.

The first group consisted of women who practiced swimming (low impact group) and the second group of women who practiced gymnastics and track and field (high-impact group). The results show that there was no difference in the prevalence of the symptom of stress incontinence between the high- versus low-impact groups. The author concluded that participation in regular, strenuous, high-impact activity when younger did not predispose women to a markedly higher rate of clinically significant urinary incontinence in later life. We believe that further research is needed to compare trained and untrained women.

3. Conclusions

The presence of urinary incontinence in athletes is not sufficiently studied. There are very few researches on this problem.

First studies on this topic were published in the 80 years of last century. Most studies are from the last ten years. This shows a growing interested in the topic. However, the depth of the problem is still far from being achieved.

Most of the studies are on the prevalence of urinary incontinence among athletes. Some authors had targeted reasonably to determine the problem in different sports. We consider this area of work must be further developed.

We believe another aspect that need to be developed in future is long-term impact of different sports on the function of the lower urinary tract.

Studies related to pregnancy and post-natal period are useful to identify the problem and its prevention.

There are no studies on how vigorous exercises influence on the pelvic floor muscles. Many exercises can lead to increase pressure on the pelvic muscles. This can lead to their weakening. Weakness of the pelvic floor muscles is known etiologic factor for the occurrence of stress urinary incontinence.

In conclusion, we believe further studies are needed.

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