



# Urinary incontinence and physical activity practice

Aletha Silva Caetano<sup>1</sup>, Maria da Consolação Gomes Cunha Fernandes Tavares<sup>2</sup>  
and Maria Helena Baena de Moraes Lopes<sup>3</sup>

## ABSTRACT

The urinary incontinence is defined as “every involuntary loss of urinary”. It happens with women more frequently, and is mainly caused by childbirths and gestations that can injure the muscles responsible for the women continence. Indeed, it is very common women who practice physical activities and sports to present incontinence. Many of these women abandon their activities to prevent discharging urine during these practices which causes shame, embarrassment besides interference with the performance during the exercise. There is no research that argues this subject in the area of the physical education. The objective of this study consisted in a bibliographical revision about urinary incontinence, analyzing its relation with physical activities and sports for women, the impact caused by the incontinence in these practices, and in what form the physical education professional can facilitate a more comfortable and safe practices to these women. The literature data on this subject is very recent, but they are enough to evidence that the physical and sport practices of exercises demanding a lot of efforts and high impact can lead to the urinary incontinence. The women who do not abandon their activities because of this incontinence use some strategies to prevent the discharge of urine, as the use of absorbents and water restriction. The physical education professional has a basic role in the adequate orientation of exercises transforming this practice into a urinary incontinence preventive intervention among physically active women.

## INTRODUCTION

Regular practice of physical activity, including aerobic exercises, of muscular strengthening and of flexibility, has usually the indication for treatment and prevention processes of heart diseases, hypertension, osteoporosis, obesity, diabetes, among others<sup>(1)</sup>. Moreover, it has positive effects over emotional aspects, decreasing the deleterious effects of stress, diminishing tensions, improving humor, anxiety and depression<sup>(2)</sup>.

The quitting from physical activities or the lack of this practice may lead to sedentary habits which are precursors of other diseases. Urinary incontinence is a disease which happens to women of all ages who practice exercise and it makes a large number of them abandon the activities practice in order to avoid urine leaking during exercise. Therefore, these women are deprived from the ben-

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efits which are intrinsic to this practice. Only from the end of the 80's, research approaching issues concerned with urinary incontinence and physical activity in athlete and non-athlete women started to appear<sup>(3)</sup>. However, there are no scientific publications on urinary incontinence in the physical education field and this issue is still little known. This gap may lead the physical education professional to neglect issues concerned with urinary incontinence with female students and athletes as well as to improve the appearance of urinary incontinence.

Due to the shortage of knowledge in the physical education field on incontinence, the aim of the present study was to conduct a bibliographic review concerning urinary incontinence, analyzing its relationship with physical and sportive activities practice by women of any age, the impact caused by the urinary incontinence in such practice, as well as how the physical education professional may contribute to those women, providing safer and more comfortable physical activity practice.

## URINARY INCONTINENCE

Until 1998, urinary incontinence was simply a symptom and in 1998 it was considered a disease by the International Classification of Diseases (ICD/WHO). Urinary incontinence was defined by the International Continence Society, as ‘complaint of any involuntary urine leaking’<sup>(4)</sup>. It may be evaluated as a symptom, a signal or a condition. A symptom is the subjective indicator of a disease [...]; a signal is what can be observed by the doctor [...] and a condition is defined by the presence of urodynamic observation (a study through examinations) associated with characteristic symptoms of urinary incontinence and signals and/or by the non-urodynamic evidence of relevant pathologic process. The most usual types of urinary incontinence are: effort urinary incontinence, which is the urine leaking associated with physical activities which increase the intra-abdominal pressure; urge-incontinence, involuntary urine leaking associated with a strong urge to urinate; and mixed urinary incontinence, when both previous types are present<sup>(4)</sup>.

The most usual type of urinary incontinence among women is the effort urinary incontinence which is responsible for almost half of the cases. Effort urinary incontinence occurs most frequently with young women, aged between 25 and 49 years<sup>(5-6)</sup>. Middle-aged women, that is, close to menopause, are more committed by mixed urinary incontinence and older women by the urge-incontinence. The incidence of incontinence is significantly higher in females. Such fact is due to anatomic reasons, hormonal changes and consequences of deliveries and pregnancies which may dislocate as well as weaken the perineum muscles<sup>(7-8)</sup>. The perineum represents the set of soft parts which close the pelvis and hold the viscera in a vertical position and the anal elevator muscle, located in the perineum. It is the main responsible for urinary incontinence in women<sup>(9)</sup>. Other risk factors also are considered for the development of incontinence. Among them we find: age, obesity, menopause, gynecologic surgeries, intestinal constipation, chronic diseases, hereditary factors, drug use, caffeine intake, smoking and physical exercise<sup>(10-11)</sup>.

1. Mestranda da Faculdade de Educação Física da Universidade Estadual de Campinas, Bacharel em Educação Física e Especialista em Atividade Motora Adaptada pela Faculdade de Educação Física da Universidade Estadual de Campinas.
2. Médica Fisiatra, Mestre e Doutora em Medicina Interna pela Faculdade de Ciências Médicas da Universidade Estadual de Campinas. Professora Livre-Docente do Departamento de Atividade Física Adaptada da Faculdade de Educação Física da Universidade Estadual de Campinas.
3. Enfermeira Livre-Docente, Professora Associada do Departamento de Enfermagem da Faculdade de Ciências Médicas da Universidade Estadual de Campinas.

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**Correspondence to:** Aletha Silva Caetano, Rua Maria Simões de Andrade, 357, Jardim Ricardo Duzzi – 13160-000 – Artur Nogueira, SP.  
E-mail: alethacaetano@hotmail.com

Physically active women present more frequently effort urinary incontinence. Although the literature are not conclusive concerning this issue, studies have shown that exercises which demand a lot of physical effort and high impact, may cause an excessive increase in the intra-abdominal pressure. This increase in the abdominal region may overload the pelvic organs pushing them down, causing hence damage to the muscles responsive for the support of these organs. Within this context, exercising becomes a risk factor for the development of urinary incontinence in women, especially in those who do not present delivery and pregnancy history<sup>(12-14)</sup>.

The impact caused by incontinence in women, is not limited to its physical aspects. It negatively affects the sexual, social, domestic and occupational levels of the woman's life. Women with urinary incontinence fell ashamed, embarrassed for social and sportive activities and less attracted to sexual relationships. Incontinence is also associated to feelings of loneliness and sadness. Some studies have shown that around 80% of women with severe symptoms of incontinence present depressive symptoms, followed by decrease of self-esteem and increase of anxiety<sup>(15-19)</sup>.

The prevalence of urinary incontinence in women may vary from 12% to 56%. Therefore, one should consider the methodology used by the study's performance, the population's characteristic (age, professional activity, presence of chronic diseases, menopause), diagnosis used, among others<sup>(11)</sup>. In the Brazilian population we did not find epidemiological studies concerning the prevalence of urinary incontinence in women who participate in physical and sportive activities.

## URINARY INCONTINENCE AND PHYSICAL AND SPORTIVE ACTIVITIES PRACTICE BY WOMEN

For some authors, physical activity of high impact is a risk factor for the development of urinary incontinence<sup>(3,20-23)</sup>. Physical activity may 'evidence' urinary incontinence, and it becomes then noticed only after physical activities which are prone to urine leaking even in women who do not have risk factors such as age and disparity. Studies have shown that young nulliparous women who practice physical activities usually complain about incontinence<sup>(20,24-26)</sup>. They relate urinary incontinence in nulliparous athletes with absorption of impact force which some activities provoke. Long jumps make the feet contact to the ground possible and can generate a reaction maximal force which increases in 16 times the body weight<sup>(27)</sup>. Such impact caused by impact exercises, may affect the incontinence mechanism by the change of strength given to the pelvic floor. The impact transmission strength which occurs between the feet and the ground and which is transferred to the pelvic floor may contribute to the incontinence in young nulliparous women who practice sports which demand high impact<sup>(26,28)</sup>.

The amenorrhea attributed to intense exercise, eating disorders or the combination of both may contribute to urinary incontinence in female athletes. Another hypothesis is the genetic weakness of the conjunctive tissue of the perineum region, its site in the lowest part of the pelvic floor as well as the reduced number of muscle fibers of this region (especially fast contraction fibers) or the lack of training and control of these muscles<sup>(29)</sup>. Changes in the cellular composition of the tissue, amount and duration of the effort against the pelvic floor are other possibilities<sup>(30)</sup>.

Gymnastics and running<sup>(20,23-26,28-29)</sup> are among the activities with the most complaints about urine leaking in women who physically exercise. These data, however, are derived from a restrict number of investigations which have been developed only from the end of the 80's.

Nygaard in 1994<sup>(20)</sup> when studying 156 female nullipars athletes, mean age of 19.9 years, and 28% reported urine loss during their sportive practice. Gymnastics was the sport which presented the most urine leaking (67%), followed by basketball (66%), tennis

(50%), hockey (42%); trekking (29%); swimming (10%); volleyball (9%); softball (6%) and golf (0%). The activities which provided the most urine loss were those which included jumps, high-impact landing and running. Jumping with legs open was a complaint in 30% of the athletes; followed by jumping with legs together (28%). The author believes that women have a 'continence threshold' which corresponds to the amount and time which the perineum muscles can stand efforts and repetitive impacts. If the 'threshold' is exceeded, these muscles are fatigued and lose their efficiency, especially if these have not been prepared for these conditions. In the same investigation, about 40% of the athletes reported urine loss during sportive practice in high school (15 to 17 years of age usually) and 17% in junior high school (7 to 14 years of age).

In a retrospective study also developed by Nygaard<sup>(28)</sup>, 104 women who participated in the Olympic Games between 1960 and 1976 were evaluated. 35% of the athletes who participated in the high impact activities such as gymnastics and trekking reported that they had lost urine during this sportive practice. Swimming, which is considered a low impact sport, was responsible for only 4.5% of the complaints.

Kari Bo<sup>(31)</sup> compared the prevalence of effort urinary incontinence and urge-incontinence in 660 athletes from a national junior and senior team with a control group of 765 non-athlete women. The age range of the women was of 15-39 years. Only 4% of the athletes have had offspring and 33% in the non-athlete women group. The data concerning the parity should be considered like that, and were more significant in the control group. There was not significant difference in the prevalence of effort urinary incontinence in the athletes and non-athletes, 41% and 39% respectively. About 27% of the athletes have reported urine leaking during coughing, sneezing and laughing, 29% during physical activities and 15% during rough movements or when rising. Another aspect evaluated was the prevalence of eating disorder between the two groups. Eating disorder was evaluated through the DSM-IV protocol developed by the *American Psychiatric Association*<sup>(32)</sup>. It has been observed that in the athletes the prevalence of eating disorder was of 20% compared with 9% of the control group. Among these athletes, 49% presented effort urinary incontinence compared with the control group which presented 38.8%. The presence of urinary incontinence in women with eating disorder may be related with the vomiting self-induction, (an attitude implicit in this condition), which submits the pelvic floor to significant repetitive pressure which may cause a negative accumulation of impact for this region. The practice of high impact sports without proper orientation, may worsen even more urinary incontinence in athletes with eating disorder<sup>(31,33)</sup>.

Thyssen<sup>(22)</sup> studied 291 female athletes, mean age of 22.8 years, and confirmed that 51.9% had experienced urine loss during their respective sports and in different situations of daily life. One hundred and twenty-five women (43%) reported urine loss only during sportive practice. 95.2% out of these 125 athletes had lost urine during training, while 64 (51.2%) had lost it during competitions. The author explains that this difference may be concerned with 'a ritual' from the part of the athletes to empty the bladder before competitions and with decrease of fluid intake.

The highest prevalence of urine leaking in the investigations was verified in trampolinists<sup>(25)</sup>. Thirty-five nulliparous athletes, mean age of 15 years (12-22 years) were considered. 80% of the total athletes complained about urine loss while jumping in the trampoline. All athletes above 15 of age have complained. The athletes who have complained about urine loss reported that the incontinence started after two years and a half of training. The urinary loss was associated with time of training, age, training duration and frequency. The incontinent athletes were older and have had a longer as well as more frequent training than those who did not present the symptoms. During the tests, they were less capable of voluntarily interrupt urine while contracting the perineum mus-

cles than the group which was not incontinent. These athletes have probably been exposed to continuous efforts and impacts which in the lack of strength training for the perineum muscles, may have weakened, developing to urinary incontinence.

Urinary incontinence has also been observed in women who practiced physical activities outside the competitive environment. The first ones were published from 1989 on by Kari Bo<sup>(34)</sup>. The author compared a group of physical education students with nutrition students. Mean age of the subjects was 22.9 years, ranging from 19 to 59 years. The variables considered in the study were: age, parity and participation in different types of physical exercise. About 26% of the physical education students reported urine loss, and 19% among the nutrition students. This difference according to the author was not significant between groups. However, when the physical education students who exercised more than three times a week were compared with sedentary nutrition students, the prevalence of effort urinary incontinence was significantly higher, 31% and 10% respectively.

Nygaard<sup>(35)</sup> studied 326 women with mean age of 38.5 years, (20 to 65 years) who regularly exercised; 47% had noticed some urine loss in any moment of their lives. In that research, the author did not find significant relationship between incontinence and professional occupation, educational status, weight, height or menopause. Around 33% of the women reported urine leaking during the practice of some kind of exercise. The women exercised an average of three times per week during 30 to 60 minutes. The activity which caused the most urine loss was running in 38% of the women and high impact aerobic exercises in 34%. The same author, in a more recent investigation, observed in 3,364 women between 18 and 60 years of age that one out of seven women had lost urine during physical activity<sup>(36)</sup>.

Amongst female military individuals who are members of the American Army and Air Force, studies with this population have shown a prevalence of significant urinary incontinence<sup>(21,37)</sup>. Complaint about urinary incontinence was verified in 31% out of the 563 soldiers interviewed during physical training and field training. Around 40% of the subjects reported urine loss also during 'leisure exercises' (outside the occupational activities). Aerobic activities had the highest number of complaints (42%), followed by running (35%), weight lifting (18%), walking (21%), cycling (8%), swimming (5%) and golf (3%).

## IMPACT OF INCONTINENCE ON THE PHYSICAL ACTIVITIES PRACTICE

Participation in physical activities as well as sports for women with urinary incontinence seems to be embarrassing and uncomfortable, once this practice may lead to unexpected and involuntary episodes of urine loss during practice.

Increase in the concern with incontinence may be associated with increase in the frequency of episodes of urine leaking<sup>(16)</sup>. The presence of severe symptoms of urinary incontinence may lead these women to practice less physical activities and to consider incontinence a great barrier concerned with this practice<sup>(36,38)</sup>. Over 20% of the women have quit their physical activities due to urinary incontinence<sup>(35)</sup>.

On the other hand, motivation for physical activities practice may positively interfere in the behavior of women with urinary incontinence concerning exercising. Women who searched for treatment for incontinence, regardless its success, did not change their exercising habits. Both women who did not practice physical exercises, as well as those who practiced it have not changed their behavior. More active women search for medical treatment because they want to continue exercising and to keep continent<sup>(39)</sup>. This behavior may be attributed to the high motivation to practice physical activities. More motivated women tend to underestimate urine losses and those less motivated, to overestimate these losses<sup>(34)</sup>.

Professional athletes seem to be more motivated for sports and exercise engagement and perform more stressing exercises than women who practice activities only for 'leisure'. These women continue to practice sports despite incontinence and other kinds of problems<sup>(36)</sup>.

Several investigations have stated that women who did not quit their physical activities due to incontinence, have used some strategies in order to avoid urine leaking during the activities. The most common strategies were the use of in liners or hygienic pads, emptying of the bladder before training and competitions, fluids restriction and exercises change. This latter strategy means that exercises which can cause urine loss (jumps and runs) are avoided by these women, who start to practice activities considered of low impact such as walking, cycling and swimming<sup>(22,35)</sup>. For some women these 'adaptation' measures do not seem to avoid the drop out from the physical activities. In many situations, the use of pads is not sufficient to avoid urine leaking; and therefore, in face of the first loss many women quit their activities<sup>(40)</sup>.

## PREVENTION OF URINARY INCONTINENCE DURING PHYSICAL ACTIVITY

Little is known about the function of the perineum muscles during physical and sportive practice. The majority of physical activities do not involve a voluntary contraction of these muscles during the performance of exercise which increase the intra-abdominal pressure. Thus, women who exercise do not have stronger perineal muscles than those who do not. On the contrary, women who exercise report more urine loss during activities which demand a lot of effort and impact<sup>(29)</sup>.

Female athletes should be taught how to perform a pre-contraction or a simultaneous contraction of these muscles during the exercise or high impact sport performance. This orientation is necessary, since studies have verified that one third of the women are not able to contract their perineum muscles correctly<sup>(29,41-43)</sup>. About 30% of the women reported incapacity to interrupt a urine flow<sup>(41-43)</sup>. This incapacity is associated with urine loss episodes. Trainers and coaches should encourage women; athletes or non-athletes, to perform the perineum contraction during their regular activities, since with no orientation, it is improbable that they will voluntarily think about this contraction. When women were taught how to contract the perineum muscles while coughing, it was observed that the urine loss was significantly reduced<sup>(38)</sup>. Due to these muscles' contraction exercises, 17 out of 23 women reported decrease of urine leaking during their jumps and running activities<sup>(29)</sup>. All women, athletes and non-athletes, need stimulation of these muscles in order to identify and contract them during gymnastics and aerobic training classes, preventing hence the appearance or worsening of urinary incontinence, besides improving the bladder control<sup>(34,38-39,44)</sup>. The trainer should ask their female athletes about possible symptoms of urine loss derived from effort and impact exercises in order to promote strategies which aid in solving or diminishing the problem. Moreover, the trainer should make their female athletes and students aware of urinary incontinence and its possible association with sports and exercises which demand great amounts of effort and the importance to strengthen the muscles which guarantee the urinary continence in women.

The many benefits for the body as a whole derived from regular physical exercising have been widely reported. Therefore, women with urinary incontinence should not be advised to avoid physical and sportive activities because of their incontinence. Professionals who work with physical activities, gymnastics and sports classes should be prepared and informed about urinary incontinence and its consequences in order to be able to offer guidance and aid to women of all ages who practice exercises and sports through non-invasive strategies such as the exercises for the perineum strengthening<sup>(25,38,44)</sup>, besides information, adaptations and specif-

ic care for women who present these symptoms during exercise practice.

## FINAL CONSIDERATIONS

There is no record of investigations in the physical education field which approach the practice of physical activity and urinary incontinence. This gap, associated with the lack of knowledge about the issue, hampers the professional on physical education to perform a complete and consistent work, once neglecting issues concerned with urinary incontinence may cause serious harm to women who practice physical activities. Moreover, incontinence causes social, emotional and physical disturbs and harms performance during sport and exercise.

The perineum muscles which guarantee the urinary continence in women should be mentioned in sports training programs, classes in health centers, clubs and schools, as well as any other muscle of the body. This routine can be done with specific bouts, or simultaneously with other exercises, with women of any age. During practice of activities which demand a lot of effort and impact, the perineum simultaneous contraction should be stimulated and it can provide better control and strengthening of this region, leading to the decrease of urine loss during exercise.

The research already conducted is sufficient to evidence that the practice of high impact physical activities may lead to the development of urinary incontinence in women. Within this context, physical education professionals play a crucial and decisive role. Through suitable orientation, these professionals can change the practice of physical and sportive activities into a preventive intervention for urinary incontinence. When establishing a trustful relationship with the female students and athletes, these professionals may contribute to decrease the drop out rate from physical and sportive activities of these women so that they would not be deprived from the benefits of this practice.

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## REFERENCES

1. Carrol S, Dudfield M. What is the relationship between exercise and metabolic abnormalities? A review of the metabolic syndrome. *Sports Med.* 2004;34:371-418.
2. Gorayeb N, Turibio LBN. O exercício: preparação fisiológica, avaliação médica, aspectos especiais e preventivos. São Paulo: Atheneu, 1999.
3. Bo K. Stress urinary incontinence, physical activity and pelvic floor muscle strength training. *Scand J Med Sci Sports.* 1992;2:197-206.
4. Abrams P, Cardoso L, Fall M. The standardization of terminology of lower urinary tract function: report from the standardization sub-committee of The International Continence Society. *Urology.* 2002;61:37-49.
5. Hannestad YS, Rortveit G, Daltveit AK, Hunnskaar S. Are smoking and other life-style factors associated with female urinary incontinence? The Norwegian EPINCONT study. *Int J Obstet Gynaecol.* 2003;110:247-54.
6. Minassian VA, Drutz HP. Urinary incontinence as a worldwide problem. *Int J Gynecol Obstet.* 2003;82:327-38.
7. Agency for Health Care Policy and Research (AHCPR). Overview urinary incontinence in adults clinical practice guideline update [online] Rockville, MD. March 1996. Available from: <http://www.ahcpr.gov/clinic/uiovervw.htm> (10 abr. 2006).
8. Simeonova Z, Milson I, Kullendorf AM. The prevalence of urinary incontinence and its influence on the quality of life in women from urban Swedish population. *Acta Obstet Gynecol Scand.* 1999;78:546-51.
9. Grosse D, Sengler J, editores. Reeducação perineal. São Paulo: Manole; 2001.
10. Foldspang A, Mommesen S, Lam GW. Parity as a correlate of adult female urinary incontinence prevalence. *J Epidemiol Community Health.* 1992;46:595-600.

11. Higa R. Incontinência urinária: problema ocupacional entre profissionais de enfermagem. [dissertação] Campinas (SP): Faculdade de Ciências Médicas da Unicamp; 2004.
12. Crist T, Shingleton HM, Koch GG. Stress incontinence and the nulliparous patient. *Obstet Gynecol.* 1972;40:13-7.
13. Nemir A, Middleton RP. Stress incontinence in young nulliparous women; a statistical study. *Am J Obstet Gynecol.* 1954;68(4):1166-8.
14. Wolin LH. Stress incontinence in young, health nulliparous female subjects. *J Urol.* 1969;101:545-49.
15. Fultz NH, Herzog AR. Self-report social and emotional impact of urinary incontinence. *J Am Geriatr Soc.* 2001;49:892-9.
16. Fultz N, Burgio K, Diokno AC, Kinchen K, Obenchain R, Bump R. Burden of stress urinary incontinence for community-dwelling women. *Am J Obstet Gynecol.* 2003; 189:1275-82.
17. Moller LA, Lose G, Jorgensen T. The prevalence and bothersomeness of lower urinary tract symptoms in women 40-60 years of age. *Acta Obstet Gynecol Scand.* 2000;79:298-305.
18. Norton PA, Macdonald LD, Sedgwinck PM, Stanton SL. Distress and delay associated with urinary incontinence, frequency and urgency in women. *BMJ.* 1988; 297:1187-9.
19. Samuelson A, Victor A, Tibblin G. A population study of urinary incontinence and nocturia among women aged 20-59 years. Prevalence, well-being and wish for treatment. *Acta Obstet Gynecol Scand.* 1997;76:74-80.
20. Nygaard I, Thompsom FL, Svengalis SL. Urinary incontinence in elite nulliparous athletes. *Obstet Gynecol.* 1994;84:183-7.
21. Davis G. Urinary incontinence among female soldiers. *Mil Med.* 1999;164:182-7.
22. Thyssen HH, Clevin L, Olesen S. Urinary incontinence in elite female athletes and dancers. *Int Urogynecol J.* 2002;13:15-7.
23. Bump R, Norton P. Epidemiology and natural history of pelvic floor dysfunction. *Obstet Gynecol Clin North Am.* 1998; 25:723-46.
24. Jiang K, Novi JM, Darnell S, Arya LA. Exercise and urinary incontinence in women. *Obstet Gynecol Survey.* 2004;59:717-21.
25. Eliasson K, Larsson T, Mattsson E. Prevalence of stress incontinence in elite trampolinists. *Scand J Med Sci Sports.* 2002;12:106-10.
26. Nygaard IE, Glowacki C, Saltzman CL. Relationship between foot flexibility and urinary incontinence in nulliparous varsity athletes. *Obstet Gynecol.* 1996;87(6): 1049-51.
27. Hay J. Citius, altius, longius (faster, higher, longer): the biomechanics of jumping for distance. *J Biomech.* 1993;26:7-21.
28. Nygaard I. Does prolonged high-impact activity contribute to later urinary incontinence? A retrospective cohort study of female Olympians. *Obstet Gynecol.* 1997; 90:718-22.
29. Bo K. Urinary incontinence, pelvic floor dysfunction, exercise and sport. *Sports Med.* 2004;34:451-64.
30. Harris RL, Cundiff GW, Coates KW. Urinary incontinence and pelvic prolapse in nulliparous women. *Obstet Gynecol.* 1998;92:951-4.
31. Bo K, Borgen JS. Prevalence of stress and urge urinary incontinence in elite athletes and controls. *Med Sci Sports Exerc.* 2001;33:1797-802.
32. Craig CL, Marshall AL, Sjostrom. The IPAQ Consensus Group, IPAQ Reliability and Validity Study Group. International Physical Activity Questionnaire (IPAQ): 12-country reliability and validity. *Med Sci Sports Exerc.* 2003;35:1381-95.
33. Hextall A, Majid S, Cardoso L. A prospective controlled study of urinary symptoms in women with several anorexia nervosa. *NeuroUrol Urodyn.* 1999;18:398-9.
34. Bo K, Hagen R, Kvastein B, Larsen F. Female stress urinary incontinence and participation in different sport and social activities. *Scand J Sports Sci.* 1989; 11:117-21.
35. Nygaard I, Delancey JO, Arnsdorf L. Exercise and incontinence. *Obstet Gynecol.* 1990;75:848-51.
36. Nygaard I, Girts T, Fultz NH, Kinchen K, Pohl G, Sternfeld B. Is urinary incontinence a barrier to exercise in women? *Obstet Gynecol.* 2005;106:307-14.
37. Fischer JR, Berg PH. Urinary incontinence in United States Air Force female aircrew. *Obstet Gynecol.* 1999;94:532-6.
38. Brown WJ, Miller YD. Too wet to exercise? Leaking urine as a barrier to physical activity in women. *J Sci Med Sports.* 2001;4:373-8.
39. Stach-Lempinen B, Nygard CH, Laippala RM, Metsanoja R, Kujansuu E. Is physical activity influenced by urinary incontinence? *BJOG.* 2004;111(5):475-80.
40. Tata GE. Incontinência. In: Pickles B, Compton A, Cott R, Simpson J, Vandervoort A, editores. *Fisioterapia na terceira idade.* São Paulo: Santos, 1998.
41. Keegel AH. Stress incontinence and genital relaxation. *Ciba Clin Sympos.* 1952; 35-51.
42. Bevenuti F, Caputo GM, Bardinelli S. Reeducative treatment of female genuine stress incontinence. *Am J Phys Med.* 1987;66:155-68.
43. Bo K, Larsen S, Oseid S. Knowledge about and ability to correct pelvic floor muscle exercises in women with urinary stress incontinence. *NeuroUrol Urodyn.* 1988;7:261-2.
44. Caetano AS, Tavares MCGCF, Lopes MHB. Proposta de atividades físicas para mulheres com incontinência urinária de esforço. *Lecturas Educación Física y Deportes [online]* 2004; 76. Available from: <http://www.efdeportes.com/ef76/mulheres.htm> (20 abr 2006).