

## Stress urinary incontinence behaviour in physically active and physically inactive women

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### Abstract:

**Intoduction:** Stress urinary incontinence (SUI) is a worldwide issue that affects more than 50% of women. It manifests as the involuntary leakage of urine during physical activities such as sneezing, coughing, or climbing stairs and is primarily attributed to the weakness of the pelvic floor muscles. While some scientists recommend maintaining a high level of physical activity in women to prevent SUI, there is scientific evidence that it also occurs in high-level athletes. A proven conservative treatment method involves a specialized set of physical exercises for the pelvic floor. The aim of this study is to assess the effects of performing this exercise regimen for three months on the behavior of SUI in physically active and physically inactive women in their everyday lives. **Materials and methods:** We conducted a study among females with SUI in the Ruse region, Bulgaria. After establishing inclusion and exclusion criteria, we selected 30 women and divided them into two groups of 15 each. We used the International Physical Activity Questionnaire-Short Form (IPAQ-SF) to determine their physical activity levels and the Short Pad Test to assess the degree of urinary incontinence. After the initial analysis of the results, we categorized physically more active women engaged in sports as group I and physically inactive women as group II. Both groups followed the same pelvic floor exercise regimen for three months. Repeated Short Pad Tests showed a better symptom improvement in group II. **Conclusion:** In our study, which included a relatively small number of patients and a short follow-up period, we observed a faster reduction in SUI symptoms across all groups. However, the difference was small in patients with lower daily activity levels and in those who did not engage in significant physical activity. We hypothesize that the increased intra-abdominal pressure and strong musculature of the pelvis, abdomen, and back in women actively participating in sports and fitness may contribute to a lower success rate of the specialized pelvic floor exercise program in addressing SUI.

**Keywords:** Stress urinary incontinence, Physiotherapy, Physical active women.

### Introduction

Stress urinary incontinence (SUI) has emerged as a serious health and economic problem affecting more than 50% of the female population worldwide at some point in their lives (Ford A., 2017). Two-thirds of all reported cases of incontinence are SUI (Bo K., 2020). It affects 7% of women under the age of 39, 17% of those between the ages of 40 and 59, and 23–32% of women over the age of 60 (Rzymski P., 2021). The expectations of the World Health Organization (WHO) are for the growth of elderly people over 60 years of age from 12% to 22% in the period 2015-2050, which would rank SUI among the most socially significant diseases in the coming years (World Health Organisation, 2022).

In essence, stress urinary incontinence is defined as the involuntary leakage of urine when intra-abdominal pressure increases, manifested during activities such as sneezing, coughing, climbing stairs, loud laughter, etc. (Parashkevova P., 2022), (Gari A., 2023). Conditions that cause symptoms of urinary stress incontinence are activities of daily living that could not be restricted or reduced. (Vasileva D., 2022). The most common predisposing factors for its appearance are natural childbirth and the onset of menopause (Pashkunova P., 2022). According to scientific data, 78% of all women who have given birth report manifestations of SUI, with 64% of them reporting its manifestation during pregnancy, and 14% after childbirth (Jebakani B., 2017). The main cause of stress urinary incontinence is hypotonia or atony of the pelvic floor muscles (Stefanova I., 2022). Although modern diagnostics and therapy alleviate the symptoms, there are still unclear moments in the manifestation of urinary incontinence (Harland N., 2023).

An increasingly common method of conservative treatment of SUI disorders is physiotherapy (Wójcik M., 2023). A number of studies report reduction and even elimination of SUI symptoms with regular physical activity at any age, especially in the menopause period (Karaganova I., 2022). Actively exercising women tend to have a stronger pelvic floor and this is thought to contribute to a successful retention mechanism when there is an increase in their intra-abdominal pressure (Cross D., 2023). Moderate physical activity can increase pelvic

floor strength and modify neurophysiological mediators (such as stress) involved in the pathogenesis of incontinence (Kim M., 2022). The recovery estimate is based on the problem and motivation in the persistence of performing physical exercises (Simeonova M., 2022). There is evidence in the literature that regular physical activity is effective even in the primary and secondary prevention of SUI (Smith L., 2023).

On the other hand, however, there are proven cases of SUI in women who exercise regularly. A study covering scientific evidence in the last 5 years found that sports and fitness have a direct relationship to stress urinary incontinence. A direct relationship between increased intra-abdominal pressure and weakness of the pelvic floor muscles is established, as a result of which sports such as volleyball, basketball and trampoline jumping are not recommended to be practiced by women with this problem (Korotkevich O.S., 2022).

Stress urinary incontinence has been scientifically proven in high-level athletes performing high-intensity physical exertion (Selecka M., 2021). Data indicate that SUI affects between 20-50% of female athletes of all ages. Of them, about 40% are younger and nulliparous athletes, and the greater their workload, the more pronounced SUI (Gan Z., 2023). A study comparing high-level athletes with non-athletic women showed that high-level athletes were more prone to SUI than non-athletic women (Hagovska M., 2018).

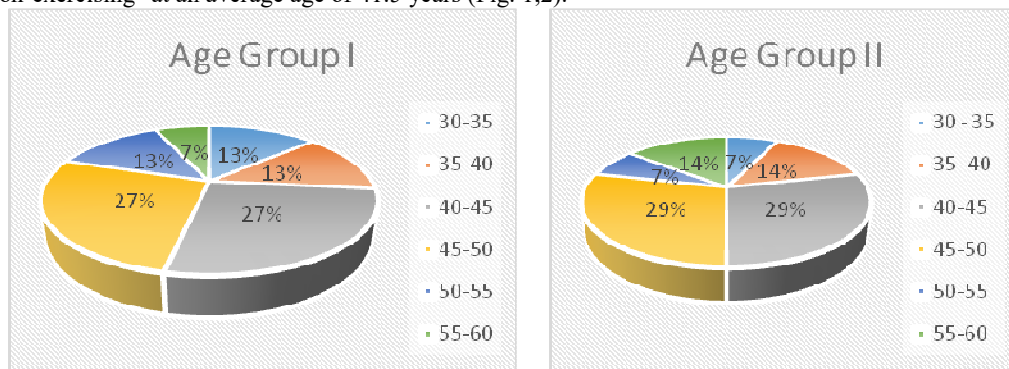
According to the European Association of Urology, therapeutic treatment of urinary incontinence, regardless of its type, should begin with exercises for the muscles of the pelvic floor (Krzysztozek K., 2017). They are the most widely used tool in SUI (Dumoulin C., 2018). A review of scientific articles on the topic showed that greater improvements in SUI symptoms occurred when women received a supervised exercise program of at least three months (Ghaderi H., 2017). A study found higher effectiveness of pelvic floor exercises performed in an outpatient setting under the supervision of a physical therapist, compared to the same performed at home. At the same time, however, the results reported in the group performing the exercises at home prove their effectiveness and prove that this would be a good solution for alternative treatment of SUI (Fitz F., 2020).

### Objectives

The aim of the present study is to determine the behavior of SUI after performing a set of exercises for a period of three months in physically active women in everyday life and in physically inactive women.

### Material and methods

Within the framework of the project "Creation of an action algorithm for prevention and functional recovery in women with stress urinary incontinence" a contingent of 30 women from the Ruse region was studied, who were divided into two working groups of 15 in each. The patients included in group I were women leading an active lifestyle and defining themselves as "active and exercising", whose average age was 43.6 years. In group II, we selected female patients who lead a predominantly sedentary lifestyle and defined themselves as "inactive and non-exercising" at an average age of 41.5 years (Fig. 1,2).



Figs. 1, 2: Age distribution in both groups.

All patients underwent primary examinations by a urologist and obstetrician-gynecologist at the UMHA "Kaneff"- Ruse with a confirmed diagnosis of "stress urinary incontinence". The criteria for inclusion in the study were age from 30 to 60 years, giving birth no earlier than 6 months (without complications), complaints of involuntary discharge of urine during physical activities, lifting heavy objects or states of loud laughter, sneezing and coughing. The exclusion criteria were the presence of malignant tumor diseases, obesity, abdominal surgery in the last 1 year, the presence of benign formation of the bladder, acute infectious process, aggravated cardiovascular diseases, prolapse of pelvic organs, hemorrhoids.

The selected patients who took part in the project, divided into the two groups, performed the same set of physical exercises for the pelvic floor muscles under the guidance of a physiotherapist within twice weekly sessions for a period of three months. On the remaining days, the patients independently performed the complex of exercises every day at home. The International Physical Activity Questionnaire – Short Form (IPAQ – SF) was used to assess their level of physical activity, and to assess the degree of urinary incontinence, patients were tested twice – initially and at the end of the three-month period using the Short Pad Test (SPT).

The IPAQ questionnaire was administered only at the beginning of the study, at the end of which all participants reported no changes in their daily activities throughout the period.



Fig. 3: Answers to Question 1 in both groups.

The answers to question 1 show much greater physical activity with intensive physical exercises per week in group I, compared to group II. In group I, 20% (n=3) of women were defined as not performing intense physical exercises, while in group II – 66% (n=10). The number of days on which women exercised intensively in group I grew, while in group II 20% (n=3) of women indicated 1 day a week and 15% (n=2) of women - 2 days a week. In group I, 7% (n=1) was observed with 1 and 2 days per week, 15% (n=2) marked 3 days, a peak of 20% (n=3) women reported 4 days per week, 15% (n=2) reported 5 and 6 days each, and 7% (n=1) reported daily vigorous physical activities (Fig. 3).

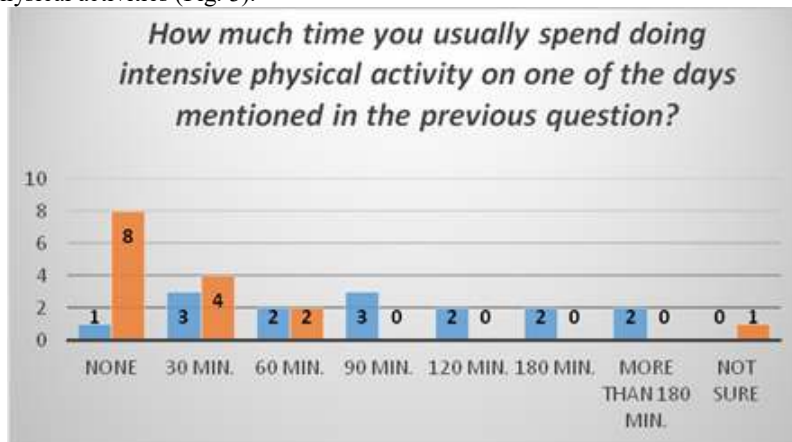


Fig. 4: Answers to Question 2 in both groups.

Based on the answers to the previous question, it was quite expected that the patients in group I spent much more time performing intense physical exercises compared to the patients in group I. For example, 53% (n=8) of the patients in group II indicated, that they do not spend time performing intense physical activities, 26% (n=4) indicate 30 min. on a daily basis and only 15% (n=2) spend 60 min. At the same time in group I 20% (n=3) indicate a duration of 30 min., 15% (n=2) – 60 min., 20% (n=3) – 90 min., 15% (n=2) – 120 min., 15% (n=2) – 180 min. and 15% (n=2) – more than 180 min. (Fig. 4).

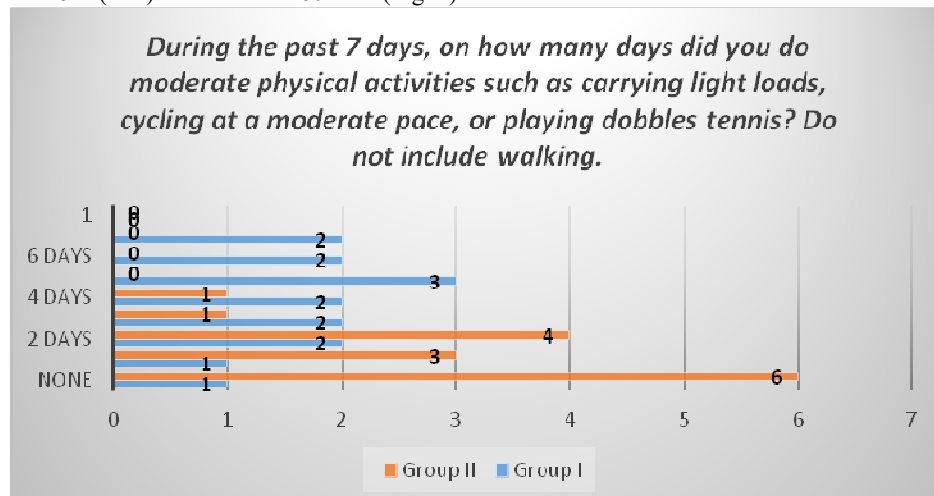


Fig. 5: Answers to Question 3 in both groups

Regarding the performance of moderate physical activities, the patients of group II are again less active, compared to the patients of group I. 40% (n=6) of group II indicate that they do not perform such, 20% (n=3) spend one day a week in moderate physical activities, 26% (n=4) – 2 days and 7% (n=1) – 3 and 4 days each. At the same time, patients from group I scored 7% (n=1) – not performing even 1 day, 14% (n=2) – 2, 3 and 4 days, 20% (n=3) and 14 % (n=2) – 6 and 7 days a week (Fig. 5).

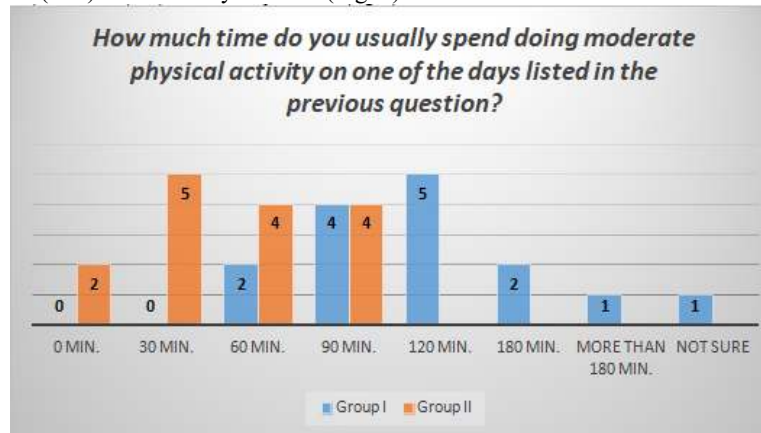


Fig. 6: Answers to Question 4 in both groups

The results of the answers to question 5 expectedly confirm much more time spent performing moderate physical activities of the patients of group I. There were no answers below 60 min. on the corresponding day, 15% (n=2) indicated 60 min., 26% (n=4) – 90 min., 33% (n=5) – 120 min., 15% (n=2) – 180 min. and 7% each (n=1) – more than 180 min. and are not sure. In group II, 15% (n=2) of the participants did not spend time performing moderate physical exertion, 33% (n=5) spent 30 minutes and 26% (n=4) – 60 and 90 minutes each (Fig. 6).

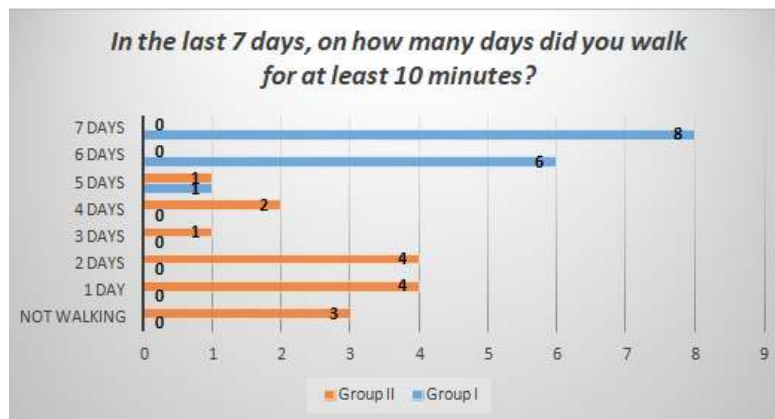


Fig. 7: Answers to Question 5 in both groups

On the days of the week spent walking, again patients in group I were much more active. They highlight results where 7% (n=1) of participants walked 5 days a week, 40% (n=6) walked 6 days a week and 53% (n=8) walked 7 days. Participants in group II walked significantly fewer days, where 20% (n=3) noted that they did not walk at all, 26% (n=4) – 1 and 2 days each, 7% (n=1) – 3 days, 15% (n=2) – 4 days and 7% (n=1) – 5 days a week (Fig. 7).

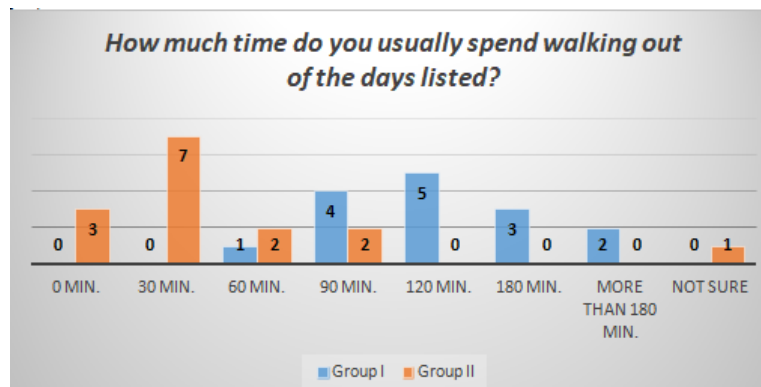


Fig. 8: Answers to Question 6 in both groups.

The time spent walking on the respective day was again significantly longer in patients from group I. In them, 7% (n=1) indicated that they walked 60 min., 26% (n=4) – 90 min., 33% (n=5) – 120 min., 20% (n=3) – 180 min. and 15% (n=2) – more than 180 min. Group II ladies spent no time walking at all 20% (n=3), 45% (n=7) – 30 min., 15% (n=2) – 60 min. and 15% (n=2) – 90 min., and 7% (n=1) are not sure (Fig. 8).



Fig. 9: Answers to Question 7 in both groups

Question 7 relates to time spent sitting. Here again, patients in group II spent much more time sitting than those in group I. In group I, 7% (n=1) reported that they spent more than 30 min sitting, 15% (n=2) – 60 min., 20% (n=3) – 90 and 120 min., 27% (n=4) – 180 min. and 15% (n=2) – more than 180 min. In group II, the minimum time spent sitting is 120 min - 40% (n=6), 180 min - 33% (n=5) and more than 180 min - 27% (n=4) (Fig.9).

The results of the Short Pad Test showed a mild degree of stress urinary incontinence in both groups with average values in group I - 1 gr, and in group II - 1.3 gr. At the end of the research period, in the retest after the implementation of the complex of specific pelvic floor exercises after a 3-month period, group I reported a mean of 0.7 gr. and group II a mean of 0.2gr. at  $p = 0.0001$ .

## Conclusion

Based on the study conducted, the pelvic floor muscle training program conducted and the results obtained, despite the small number of patients and the short follow-up time, we observed a faster reduction in stress urinary incontinence symptoms, albeit with small differences in patients who are less active in daily life and do not perform significant physical activities. We assume that the increased intra-abdominal pressure and the strong musculature of the pelvis, abdomen and back in women actively engaged in sports and fitness lead to a lower success rate of the specialized complex for the pelvic floor to affect stress urinary incontinence.

## Conflicts of Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this article.

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