SHORT COMMUNICATION

Pelvic Floor Muscle Exercises for the Management of Urinary Incontinence Historical Review

Abstract
Urinary incontinence is a significant health issue, and various international organizations (ICS, IUGA, AUA, EAU) have concentrated on managing this condition. Conservative management, especially programs for Pelvic Floor Muscle Exercises (PFME), is of particular interest.
The earliest known texts date back to antiquity, but after a long period of inactivity during the Middle Ages, individual cases began to be reported from the 16th to 18th centuries. Scientific interest in the topic resumed in the mid-1800s in Sweden, followed by the UK. Physiotherapy developed into an independent profession at the end of the 19th century, and in 1921, Mary McMillan (USA) founded the American Physical Therapy Association (APTA). Miss Minnie Randel introduced pelvic floor exercises for women in the maternity ward in 1936. Margaret Morris, a student of M. Randel, created an exercise system emphasizing conscious contraction and relaxation of the pelvic floor muscles. Prof Arnold Kegel, known as the "father" of PFME, established Kegel's exercises as a regular practice in 1948. In the 1970s, Dorothy Mandelstam developed a new physiotherapy internship, and Dr. Jo Laycock became the first physiotherapist to join the ICS Board. Over the past 20 years, the importance of PFME for managing post-prostatectomy incontinence has been documented.
In conclusion, physiotherapists specializing in the pelvic floor, as part of a multidisciplinary team with urologists and urogynecologists, play an active role in managing patients with urinary incontinence.

Key words: Pelvic Floor, Physical Therapists, Conservative Treatment, Urinary Incontinence

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Leonidas Floratos (M.Sc. Student)[1]
Diamantis Floratos (Ph.D.)[2]

1- Physiotherapist, Post-graduate student of Medical School, National and Kapodistrian University of Athens, Greece
2- Urologist, Head of Private Urodynamic and Neuro-urology practice, Athens, Greece

Correspondence:
Diamantis Floratos
Urologist, Head of Private Urodynamic and Neuro-urology practice, Athens, Greece

e-mail: flordial@yahoo.com

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Introduction

The symptom of urinary incontinence (UI), is defined as the complaint of involuntary loss of urine (CILU) (Haylen, et al., 2010). Urinary incontinence is bothersome, and the involuntary loss of urine is a social or hygienic problem.

Urinary incontinence is classified into: (a) stress incontinence, the CILU on effort or physical exertion (e.g. sporting activities), or on sneezing or coughing. (b) urge incontinence, the CILU associated with urgency and (c) mixed urinary incontinence, the CILU accompanied by urgency, but also during effort, exercise, sneezing and coughing (Haylen, et al., 2010). Other types include continuous incontinence of urine, loss of urine without awareness, and incontinence during intercourse. Incontinence occurs in women more than men, with a ratio of 2:1. The overall prevalence is for female 25-45%, while for male 1-39%. The wide variation is due to differences in study populations, the definition of incontinence, and the different assessment methods used (Abrams, et al., 2018).

The management of stress urinary incontinence is classically surgical, both in men and women (mid-urethral tapes, Burch colpo-suspension, bulking agents and artificial sphincter). Drawbacks include invasiveness, significant cost, and a considerable number of complications (Abrams, et al., 2018).

As an alternative method, conservative treatment using behavioral training, with pelvic floor muscles exercises (PFME), has been proposed 80 years ago. The theory behind this treatment assumes that bladder responses and sphincter control are acquired normally and that these responses can be retaught, aiming to increase pelvic floor strength and endurance, through muscle retraining (Wells, 1990).

But the idea of PFME programs aiming to achieve wellness, sexual health and a generally good quality of life has a long history.

Historical Review

Early references to PFME appear in ancient Chinese and Indian texts almost 6000 years ago. The history of physical therapy has its roots in ancient Greece. Hippocrates and Galen, considered the first "physical therapists", have described PFME programs in the baths and gymnasiums of Ancient Greece and Rome (Pettman, 2007), using massages, therapeutic manipulations and hydrotherapy. The idea was that strengthening of the PFM group could promote health, longevity, mental improvement and sexual well-being.

Subsequently, during the period of the Dark Middle Ages, all healing techniques were abandoned.

The first reference to physical therapy was made by Dr. Timothy Bright at Cambridge University in England, with a lecture on the use of hydrotherapy, exercises and therapeutic manipulations (1584) (Pettman, 2007). At the end of the 18th century, the treatment of some forms of urinary incontinence by applying patches to the lower abdomen or the sacrum, together with the use of electricity is mentioned (Oliphant, 1786; Cooke, 1803).

In the early 19th century, the first reference to physical therapy was made by Per Henrik Ling, a fencing teacher who was the founder of the Royal Central Institute of Gymnastics (RCIG) and the father of Swedish Gymnastics. His son and successor Hjalmar Ling together with his colleagues, further developed and promoted the so-called "Swedish therapeutic gymnastics and massage". In the 1860s, significant numbers of women were treated with "gynecological gymnastics." Sweden was the first country to recognize

physiotherapy as an independent profession in 1887. In 1864, the first book on Pelvic Floor Physiotherapy was published, focusing on the use of therapeutic exercises for gynecological patients. In 1894, four nurses and midwives from the UK, Lucy Robinson, Rosalind Paget, Elizabeth Manley and Margaret Palmer formed the Chartered Society of Physiotherapy. In 1913-14, new schools of Physiotherapy were developed in New Zealand and USA which led to the graduation of the first "rehabilitation aids". They undertook and carried out an important project, participating in the rehabilitation of patients during the period of poliomyelitis and the 1st World War (Haslam, 2008, p. 85).

In 1921, Mary Mc Millan announced the first physiotherapy research and created the American Women's Physical Therapy Association, currently the "American PT Association (APTA)". Miss Minnie Randell, was the director of the School of Massage and Medical Gymnastics at St. Thomas, in London, and 70 years ago, invented and developed a system of exercises for women in the obstetrics department, introducing the idea of treating urinary incontinence using pelvic floor exercises (Randell, 1948). Mr. Terence Millin (1903-1980), a well-known urologist, had published in the Proceedings of the Royal Society of Medicine (1939) on the role of physical therapy, including electrotherapy, as a therapeutic method of treating mild forms of urinary incontinence (Millin, 1939).

The "father" of modern PFME is wrongly considered to be Dr. Arnold Kegel. The pioneer of the technique is Margaret Morris, a former ballet dancer and student of M. Randell, who introduced PFME in 1936 at St. Thomas. She developed a system of exercises, focusing on pregnant women, and published an article on the importance of consciously controlling the contraction and relaxation of the muscles of the pelvic floor, sphincters, and lower abdominal wall. Thus, she encouraged women to practice trying to "reverse the clamps until it becomes a habit" and that "this should be performed to the sound of Schubert's Waltz 16, No. 2 (Morris, and Randell, 1936).

The use of PFME, as a therapeutic method for stress urinary incontinence, became widespread at 1948, when Prof. Arnold Kegel, established the method as standard practice. In his article 'Progressive resistance exercise in the functional restoration of the perineal muscles', he presented the successful treatment of 64 patients with stress urinary incontinence, using the so-called "Kegel exercises" (Kegel, 1948).

In the 1970s, Dorothy Mandelstam, a physiotherapist from UK, the so-called "Queen of Continence", developed the new physiotherapy specialty, regarding the pelvic floor and its dysfunctions. She trained at King's College Hospital Physiotherapy School. At the geriatric unit of Guy's Hospital, she tested the hypothesis that by practicing suitable exercises many diseases could be prevented. As she noticed the high incidence of incontinence among elderly women, she studied the possible relation of childbirth and damage to the pelvic floor muscles and the role of re-education of these muscles to achieve adequate function afterwards. She was the first non-medical member and the first physiotherapist to join ICS in 1975, followed 10 years later by Jeannette Haslam and Marijke Slieker ten Hove. Jo Laycock and Kari Bø presented the results of their research during the 2nd ICS Congress in 1988, in Oslo, Norway (Laycock, 1988) 15-16 and Marijke Slieker ten Hove organized the first Physiotherapy Round Table in order to encourage young physiotherapists to engage in incontinence research. Kari Bø and Ragnar Stien, in 1994, demonstrated that the striated muscle of the urethral wall contracts synergistically with the contraction of the pelvic floor muscles, hip adductors and gluteal muscles, but not

during the contraction of the abdominal muscles, supporting M. Randell's hypothesis, which was presented 50 years ago (Bø, and Stien, 1994).

A large number of scientific publications on PFM physiotherapy have been published, establishing the role of physiotherapists in the treatment of incontinence. Marijke Slieker ten Hove won the first clinical presentation award in 2004 in Paris, the first female physiotherapist to receive such an award. Jo Laycock has an enormous contribution to the physiotherapy care of urinary incontinence and the establishment of pelvic floor research as evidence-based practice. She received her PhD Thesis on: "Assessment and treatment of pelvic floor dysfunction" in 1992 from the University of Bradford, UK. Among others, her achievements were: a) the first physiotherapist who participated in 1985, as a Board member, in the ICS conference, b) her participation in the writing of the fundamental article: "Standardization of terminology of pelvic floor muscle function", in 2005, c) the development and validation of the pelvic floor muscle assessment tool (PERFECT Scale) in 2001, which is still widely used today. (Laycock, and Jerwood, 2001). During her 42-years career, she has published extensively in research articles and co-authored several books on achieving continence and pelvic floor rehabilitation. For her services, she received the Order of the British Empire (OBE) from Queen Elizabeth II in 2001 and the ICS Life Time Achievement Award from the ICS in 2011.

At the same time, the indications for the application of a PFME program were extended to the male population, due to the widespread application of radical prostatectomy since the 1990s, with the significant incidence of postoperative urinary incontinence. The first studies were published around 2000 (Chapman, 1997; Van Kampen, et al., 2000; Floratos, et al., 2002).

In the last 20 years, more than 70 clinical studies have been published on the effect of PFME on the restoration of post-prostatectomy incontinence (open, laparoscopic or robotically assisted) alone or in combination with biofeedback, electrostimulation, electro-acupuncture, Pilates, both postoperatively as well as pre-operatively. Consequently, the guidelines of the International and European Organizations emphatically recommend the importance of PFME in the treatment of both stress and urge urinary incontinence (Abrams, et al., 2018).

Today, the role of physiotherapy in the management of UI is well established and 16% of the 3145 ICS members worldwide are physiotherapists (ICS Member Profession, 2021).

The motivation of a multidisciplinary team of urologists, gynecologists and specialized pelvic floor physiotherapist should be encouraged, and adequate training of sufficient number of pelvic floor physiotherapists should be promoted. (Figure 1)

Conclusion

An ancient concept and an ongoing scientific development effort for over 150 years have led to the establishment of the technique of PFME as an effective way to treat urinary incontinence. The harmonic cooperation of urologists, gynecologists and specialist physiotherapists can and should provide satisfactory health services in the management of patients with urinary incontinence.

Figure 1. Pioneers of PFME for the Management of Urinary Incontinence. (Images from public domain websites[1])

Authors' Contribution

Leonidas Floratos collected the Bibliography and wrote the original manuscript. Diamantis Floratos proposed the initial idea, reviewed and edited the manuscript. All authors read and approved the final version of the work.

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Conflict of Interest

None.

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