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ORIGINAL CLINICAL ARTICLE

Evaluating the primary use, strengths and weaknesses of pelvic floor muscle training devices available online

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Abstract

Aims: Treatment for urinary incontinence (UI) includes pelvic floor muscle training (PFMT). There is limited data appraising the characteristics of PFMT devices. We aimed to ascertain the primary use, strengths and weaknesses of PFMT devices available online, through evaluation of consumer reviews.

Methods: We performed an analysis of PFMT devices on [Amazon.com](https://www.amazon.com). Four key device categories were recognized. Reviews from the five most frequently-reviewed products per category were analyzed ($n = 20$). We characterized device use, strengths and weaknesses using thematic analysis.

Results: We evaluated 2574 PFMT device reviews including 1168 vibrating Kegel balls, 750 non-vibrating Kegel balls, 411 pelvic floor or thigh exercisers, and 245 electric probes. Non-vibrating Kegel balls were rated highest (4.6/5 stars), followed by vibrating Kegel balls, electric probes and pelvic floor or thigh exercisers (4.4/5, 4.1/5, and 3.8/5 stars, respectively). Most reviews were positive (77%) or negative (16%) with few neutral (7%). While all were marketed to treat UI, most reviews did not mention the intended use. Vibrating and non-vibrating Kegel balls and electric probes were most likely to be used for UI, and pelvic floor or thigh exercisers for toning. Some used non-vibrating and vibrating Kegel balls for sexual function. Electric probes were the most beneficial device for incontinence control (27%, 67/245). Twenty-five percent of all product reviews praised device ease of use and good quality or design. A minority of reviewers found products difficult to use, of poor quality or design and uncomfortable.

Conclusion: Consumers utilized online PFMT devices for multiple purposes, including UI, toning and sexual function. Reviewers generally praised PFMT products, particularly electric probes for UI.

KEYWORDS

device, incontinence, online, pelvic floor

1 | INTRODUCTION

Urinary incontinence (UI) affects 46% of women aged 50 to 80 years old in the United States.¹ UI is associated with significant psychological distress and morbidity.^{2,3} Research has found that women with severe incontinence are more likely to experience symptoms of depression than women who are continent.⁴ Further, 62% of older women and 19% of postpartum women with UI report functional dependence or disability while performing activities of daily-living.^{5,6}

Pelvic floor muscle-training (PFMT) is often part of comprehensive, first-line management for UI. PFMT has previously been found to be a useful and efficacious tool for older adults.^{7,8} It has been estimated that 38% of women with UI do pelvic floor exercises to mitigate UI.¹ Various models of PFMT devices are sold online. However, despite the availability of PFMT devices, there is a paucity of data describing instrument utilization and patient experience.

While there have been studies to evaluate designs of absorbent products for adults experiencing UI,^{9,10} there is limited data on PFMT devices. Amazon is a popular, online platform that hosts a variety of PFMT products marketed to improve UI symptoms. In this study, we analyzed PFMT products, through an in-depth review of consumer reviews. We aimed to describe the primary use, strengths and weaknesses of major PFMT devices sold through [Amazon.com](https://www.amazon.com). This study will allow clinicians to better understand the experiences of patients who use the products for relief of UI symptoms to inform clinical response upon patient inquiry.

2 | MATERIALS AND METHODS

2.1 | Study design and data collection

We performed a cross-sectional analysis of reviews of PFMT devices sold through [Amazon.com](https://www.amazon.com). Eligible products included those that were described as pelvic floor exercisers or muscle trainers, marketed to assist consumers with UI. This meant that the product heading or description emphasized that the device could assist with urinary control. The following terms were used to find relevant products in [Amazon.com](https://www.amazon.com)'s search engine: "pelvic floor exerciser," "pelvic floor muscle trainer," "electric Kegel probe," "Kegel balls," and "bladder control devices." Search terms were ascertained based on known product type and names, auto-suggestions by Amazon based on search phrase and consumers who bought these items also shopped for, and anecdotal experience with the language patients use to describe assistive PFMT

devices. During the search process, consistent device designs were noted by authors and grouped into four main categories: vibrating Kegel balls, non-vibrating Kegel balls, pelvic floor or thigh exercisers and electric probes. Within each category, the top five products with the greatest number of reviews were selected for inclusion in the study. We believed it was important to capture the most frequently-reviewed products as this reflects the reality of local consumer choices.

For each product, key variables were extracted directly from [Amazon.com](https://www.amazon.com), including the product name, company, price, average star ratings, number of ratings, number of reviews, and the unique identifying Amazon Standard Identification Number. Subsequently, information was extracted directly from product reviews, including the date of the review, comments, and the associated star rating. Star ratings from 1 to 5 were considered analogous to a Likert scale, while product reviews provided subjective measurements of product characteristics and favorability.

2.2 | Codebook and coding process

Data was uploaded into Dedoose coding software, version 8.3.17. To create a codebook for analysis, 50 reviews across products were independently studied by two investigators (HST and AWL). Recurrent thematic elements were identified, and iteratively adjusted following two rounds of productive discussion. These concepts were used to create a codebook for further analysis of all reviews (Supplementary Material 1). Primary use was defined as the consumers' indication for device use, while device "strengths" and "weaknesses" broadly umbrellaed key characteristics, such as subjective benefit ("helped/did not help with use"), ease, quality, comfort, and more.

Eight investigators coded product reviews. Investigators attended a centralized training session where they received instructions on the software and coding process. Before data analysis, the investigators coded 30 mixed-product reviews to evaluate interrater reliability ($\kappa = 0.74$). Subsequently, each investigator independently coded a series of reviews using the appropriate coding structure. To minimize bias, reviews assigned to individuals represented a mix of device categories and prices. "Parent codes" were applied to every review comment, including device primary use, overall sentiment, positives and negatives. Where relevant, subcategorized "child codes" and "baby codes" were also applied. Iteratively, the codebook was felt to be comprehensive as no additional themes were noted by investigators during the coding process.

2.3 | Statistical analysis

Descriptive statistics were performed using Pivot tables in Excel 2016. Interrater reliability was assessed through Dedoose's in-software Kappa statistic operation.

2.4 | Ethics

Formal ethical approval was not sought as all data was made publicly available online through [Amazon.com](https://www.amazon.com).

3 | RESULTS

3.1 | Product characteristics

Twenty PFMT products, grouped into four device categories, were evaluated for their primary use, strengths and weaknesses (Table 1). Price per product varied, with electric probes costing the most (159.95 US\$ [interquartile range {IQR} = 99.99–249.99]) and pelvic floor or thigh exercisers the least (22.99 US\$ [IQR = 21.99–23.99]). Overall, pelvic floor or thigh exercisers and vibrating Kegel balls acquired the greatest number of median ratings per product, compared with non-vibrating Kegel balls and electric probes. Non-vibrating Kegel balls were rated the highest, with a median of 4.6 stars out of 5. Secondly, vibrating Kegel balls, electric probes and pelvic floor/thigh exercisers were given 4.4, 4.1, and 3.8 out of 5 stars, respectively. Non-vibrating Kegel balls received the greatest median number of reviews per product (81 [IQR = 65–133]). Vibrating Kegel balls had the greatest number of total reviews ($n = 1168$), while non-vibrating Kegel balls, pelvic floor, or thigh exercisers and electric probes had 750, 411, and 245 total reviews, respectively.

3.2 | Primary use of online PFMT devices

A total of 2574 PFMT product reviews were coded, consisting of vibrating Kegel balls ($n = 1168$), non-vibrating Kegel balls ($n = 750$), pelvic floor or thigh exercisers ($n = 411$), and electric probes ($n = 245$). Across device categories, primary product use was largely unclear from the consumer review alone (Figure 1). Electric probes were the most frequently used device for UI (35.9%, 88/245), compared with vibrating Kegel balls (16.5%, 193/1168), non-vibrating Kegel balls (15.1%, 113/750), and pelvic floor or thigh exercisers (6.6%, 27/411). Pelvic floor or thigh exercisers were most likely to be used for thigh/hip/buttock toning (36.3%, 149/411). A proportion

of non-vibrating Kegel balls (7.1%, 53/750) and vibrating Kegel balls (5.5%, 64/1168) were used for sexual pleasure or function. A minority of products were used for “other” reasons.

3.3 | Overall sentiment of online PFMT devices

The majority of PFMT product reviews were positive (76.6%, 1971/2574) (Figure 2). Proportionally, reviews of non-vibrating Kegel balls were most frequently positive (84.1%, 631/750), while reviews of electric probes were least frequently positive (65.7%, 161/245). Further, negative reviews were most commonly found within electric probe devices (25.7%, 63/245), followed by pelvic floor or thigh exercisers (24.6%, 101/411), vibrating Kegel balls (16.5%, 193/1168) and non-vibrating Kegel balls (8.8%, 66/750). A minority of PFMT product reviews were deemed “neutral” across product categories. Across device categories, 68.7% of “positive” reviews were rated 5/5 stars and 24.2% were rated 4/5 stars. Conversely, 40.3% of “Negative” reviews were rated 1/5 stars and 36.9% rated 2/5. “Neutral” reviews were most frequently rated 3/5 stars (27.2%).

3.4 | Strengths and weaknesses of online PFMT products

Overall, 41% of device reviews mentioned that the product subjectively benefited them (1049/2574) (Table 2). Electric probe devices were most commonly found to “help with incontinence” (27.3%, 67/245) (Figure 3). Secondly, vibrating Kegel balls (12%, 140/1168) and non-vibrating Kegel balls (11.1%, 83/750) helped with consumers' UI symptoms. Pelvic floor or thigh exerciser products were least likely to help with UI (4.6%, 19/411). Instead, pelvic floor or thigh exercisers were primarily beneficial for thigh/hip/buttock toning (27.3%, 112/411). Across device categories, non-vibrating Kegel balls were the most likely device to help with sexual function (8.7%, 65/750). Approximately one quarter of total product reviews noted the device's ease of use and good quality or design. Specifically, 41.3% of non-vibrating Kegel ball (310/750), 19.5% of vibrating Kegel ball (228/1168), 18.7% of pelvic floor or thigh exercisers (77/411) and 15.1% of electric probes reviews (37/245) praised device ease, while 33.9% of non-vibrating Kegel ball (254/750), 25.1% of pelvic floor or thigh exerciser (103/411), 24.1% of vibrating Kegel ball (281/1168), and 5.7% of electric probe reviews (14/245) praised the quality or design. Across device categories, non-vibrating Kegel balls were most

TABLE 1 Characteristics of online PFMT devices

	All PFMT devices (median [IQR])	Vibrating Kegel balls (median [IQR])	Non-vibrating Kegel balls (median [IQR])	Pelvic floor or thigh exercisers (median [IQR])	Electric probes (median [IQR])
Price (US\$)	29.99 (23.74–77.42)	35.99 (29.99–35.99)	24.79 (20.90–29.99)	22.99 (21.99–23.99)	159.95 (99.99–249.99)
Number of ratings per product	93 (55–147)	100 (45–124)	98 (88–300)	114 (77–160)	45 (39–58)
Star rating	4.3 out of 5 (3.9–4.5)	4.4 out of 5 (4.3–4.5)	4.6 out of 5 (4.5–4.6)	3.8 out of 5 (3.8–3.9)	4.1 out of 5 (3.6–4.3)
Number of reviews per product	60 (34–99)	53 (33–71)	81 (65–133)	70 (54–91)	34 (28–49)
Total number of reviews	2574	1168	750	411	245
Sample design	N/A

Note: PFMT devices from left to right: ManNuo vibrating Kegel balls, Cheven non-vibrating Kegel balls, Pusanas pelvic floor or thigh exerciser, and TensCare electric probe. Abbreviations: IQR, interquartile range; PFMT, pelvic floor muscle training.

FIGURE 1 Primary use of pelvic floor muscle training (PFMT) devices by device category, as proportion of number of reviews in each category. Total number of reviews in each category: vibrating Kegel balls = 1168, non-vibrating Kegel balls = 750, pelvic floor or thigh exercisers = 411, and electric probes = 245

commonly reported as comfortable (19.3%, 145/750) and vibrating Kegel balls were most commonly praised for good customer service (18%, 210/1168).

Overall, few reviews cited negative characteristics of PFMT devices. Five percent of reviews mentioned that the device did not help them (136/2574). Specifically,

12.2% of pelvic floor or thigh exercisers (50/411) mentioned that the product did not help them, compared with 11% (27/245), 3.4% (40/1168), and 2.5% (19/750) of electric probes, vibrating Kegel balls and non-vibrating Kegel balls, respectively. Generally, specific reasons for a lack of benefit were not mentioned by reviewers across

FIGURE 2 Overall sentiment of PFMT device review, as proportion of total reviews in each device category. “Neutral” refers to a review whereby the consumer did not outwardly favor or dislike the product (Supplementary Material 1). PFMT, pelvic floor muscle training

TABLE 2 Strengths and weaknesses of online PFMT devices

	All device reviews (n, %)	Vibrating Kegel balls (n, %)	Non-vibrating Kegel balls (n, %)	Pelvic floor or thigh exercisers (n, %)	Electric probes (n, %)
Strengths					
Helped with use	1049 (40.8)	454 (38.9)	283 (37.7)	182 (44.3)	130 (53.1)
Helped with incontinence	309 (12)	140 (12)	83 (11.1)	19 (4.6)	67 (27.3)
Helped with sexual function/pleasure	162 (6.3)	81 (6.9)	65 (8.7)	0 (0)	16 (6.5)
Helped with thigh/hip/buttock toning	138 (5.4)	14 (1.2)	8 (1.1)	112 (27.3)	4 (1.6)
Easy to use	652 (25.3)	228 (19.5)	310 (41.3)	77 (18.7)	37 (15.1)
Good quality or design	652 (25.3)	281 (24.1)	254 (33.9)	103 (25.1)	14 (5.7)
Comfortable	218 (8.5)	45 (3.9)	145 (19.3)	20 (4.9)	8 (3.3)
Good customer service	282 (11)	210 (18)	43 (5.7)	19 (4.6)	10 (4.1)
Good price	113 (4.4)	45 (3.9)	42 (5.6)	18 (4.4)	8 (3.3)
Weaknesses					
Did not help with use	136 (5.3)	40 (3.4)	19 (2.5)	50 (12.2)	27 (11)
Did not help with incontinence	20 (0.8)	5 (0.4)	3 (0.4)	2 (0.5)	10 (4.1)
Did not help with sexual function/pleasure	4 (0.2)	2 (0.2)	0 (0)	0 (0)	2 (0.8)
Did not help with thigh/hip/buttock toning	7 (0.3)	0 (0)	0 (0)	7 (1.7)	0 (0)
Difficult to use	122 (4.7)	44 (3.8)	34 (4.5)	28 (6.8)	16 (6.5)
Poor quality or design	251 (9.8)	154 (13.2)	39 (5.2)	39 (9.5)	19 (7.8)
Uncomfortable	58 (2.3)	8 (0.7)	18 (2.4)	10 (2.4)	22 (9)
Poor customer service	26 (1)	12 (1)	3 (0.4)	2 (0.5)	9 (3.7)
Bad price	23 (0.9)	14 (1.2)	0 (0)	1 (0.2)	8 (3.3)

Abbreviation: PFMT, pelvic floor muscle training.

product categories. A minority of reviewers felt products were difficult to use, of poor quality or design and uncomfortable. Overall, customer service and price were not frequently mentioned by reviewers.

4 | DISCUSSION

This study affirmed that online PFMT devices were variable in their primary use, serving multiple purposes alongside UI, such as toning and sexual pleasure or function. Electric probes reviews most frequently referenced primary use as incontinence control, when compared with other categories. Reviews of online PFMT devices were dominantly positive. Specifically, the majority of electric probe reviews noted that the products helped, and particularly helped the most with incontinence control. Conversely, pelvic or floor thigh exercisers appeared, instead, to help consumers with thigh/hip/buttock toning, while non-vibrating Kegel balls appeared to be the most commonly beneficial device for sexual pleasure or function. A quarter of product reviews

praised the product's ease of use and good quality or design—most notably for non-vibrating Kegel balls. Device complaints were uncommon among consumers.

Research shows that approximately 72% of US adults have consulted the internet for health-related information and this activity is most common among female patients.¹¹ This wave of “consumer health informatics,” has cemented the relevance of patients seeking health information online.¹² Now, more than ever, the medical community acknowledges patients' desire for autonomy and control over their illnesses.¹³ UI is a debilitating condition that leaves many patients with significant long-term morbidity. The link between UI and psychological distress, is augmented by risk factors, such as low education and reported low social desirability.¹⁴ Vulnerable populations such as these frequently face impeding barriers when accessing primary and specialized healthcare, both in the US and around the world.¹⁵ In the absence of access to formal healthcare services or pelvic floor physiotherapy for UI, patients may turn to online products for relief of symptoms. There does appear to be relevant purchasing of PFMT products online; however, their intended use is variable. As reported, in the

FIGURE 3 Subjective benefit of online PFMT devices for UI, as proportion of total reviews in each device category. PFMT, pelvic floor muscle training; UI, urinary incontinence

majority of online reviews, consumers did not explicitly state what their primary intention was for the product. Patients may feel stigmatized to outwardly discuss sensitive issues, such as incontinence through a widely available online forum. The stigmatization of UI is rooted in deep historical precedents surrounding the role of womanhood and proper sanitation, and is frequently propelled by modern-day medical literature.^{16–18} Further though, online PFMT products may serve dual or multiple purposes for product users. Kegel balls, for instance, are frequently purchased for sexual pleasure.¹⁹ Equally, 36% of our reviewers reported use of pelvic floor or thigh exercisers for primarily thigh/butt/hip toning, rather than incontinence control. In this way, it can be challenging to ascertain PFMT products' explicit primary use for consumers with UI, as these devices appear to be used for different reasons.

Our results showed that 77% of online PFMT device reviews were positive. There also appeared to be a relationship between review favorability and associated star rating. Clinically, this information may be useful to providers when addressing patients who demonstrate interest in online PFMT products. Electric probes appeared to serve the greatest primary use for patients seeking relief of UI symptoms. Comprehensive literature highlights the significant role of electric stimulation in managing patients with incontinence.^{20,21} A Norwegian trial found that 61% of women reported UI improvement following a trial of home-managed electrical stimulation.²² However, further research notes that the benefits

of intravaginal electrical stimulation may be minimal for patients with stress incontinence.²³ In parallel to their primary use though, electric probe devices were the most expensive device category. When searching online for PFMT assistive devices, women may be disincentivized to purchase electric probes due to financial constraints. Cost-considerations should be addressed in consultations with patients regarding future PFMT device purchases. For cost and simplicity, patients may instead gravitate towards non-vibrating Kegel balls. Their simplistic design and ease of use appear to be appealing traits to those searching online for assistive PFMT devices; however, their primary use for UI was less clear. A prospective randomized control trial found that PFMT assisted by weighted vaginal balls was more efficacious at reducing urinary leakage among women with stress UI, compared with non-assisted PFMT.²⁴ Similar findings denote the primary use of vaginal balls when preventing UI in the postpartum period; however widespread data in this realm, is limited.²⁵ Further, in our cohort, there were largely no differences in subjective benefit between vibrating versus non-vibrating Kegel balls; however non-vibrating Kegel balls were praised more frequently for their ease of use, quality or design and comfort. Surrounding academic literature has yet to describe major differences between these two categories.

While we believe this study demonstrates findings from a novel field of study, we acknowledge several limitations. First, we were reliant on existing,

consumer-level reviews to ascertain the characteristics of online PFMT products. As such, our findings are limited by the breadth and depth of information we were able to gather. For example, further details of UI and sexual pleasure improvements, such as type or frequency, were often not expressed by consumers, leaving authors to cast a broad categorical conclusion. We were also selectively limited to only products available through [Amazon.com](https://www.amazon.com), purchased by consumers who have access to the Internet and/or funds to make online purchases. In addition, as mentioned, the primary use of UI products was not often specified, leading to challenges when concluding what specifically the products helped or did not help with. For instance, broad categories, such as “helped with use” and “did not help with use” were frequently coded; however, subdivisions were less commonly mentioned. This leaves authors unable to definitively correlate primary use with device efficacy. For clinicians, we believe this data should serve as commentary on the broad variability in device use (i.e., UI, sexual, and toning). Future work should incorporate mixed methodology to better understand patient perspectives through interviews on different types of PFMT devices, for the patient's specific, intended purpose.

Among our cohort of consumers of online PFMT products, categories of PFMT devices were reviewed favorably. In particular, electric probes were the most commonly used devices for incontinence control, with associated reported subjective benefit for relief of UI symptoms. However, PFMT devices were also used for alternative purposes such as thigh/hip/buttock toning and sexual pleasure or function, as evidenced by pelvic floor or thigh exercisers and Kegel balls. In the face of barriers to healthcare, patients may employ online PFMT devices as a first-line defense against symptoms. We believe this is an important step in the medical literature towards the recognition and incorporation of widely available and heavily marketed online medical devices into clinical consideration.

5 | CONCLUSION

Consumers appear to purchase online, assistive devices for PFMT not only for UI, but also thigh/hip/buttock toning and sexual pleasure or function purposes. Regardless of intended use, reviews of online PFMT devices were generally positive, praising product ease of use and good quality or design, among others. Electric probe devices were the most beneficial device category for UI. Given the rapid expansion of marketing for online products advertised to assist with disease morbidity, patients may present with queries in the clinical setting. We believe it is valuable for urologists to understand the PFMT device landscape to be

able to discuss the strengths and weaknesses with patients shopping online for UI relief. While this represents an important step towards inclusion of privately marketed urology products in academic literature, future work should incorporate novel methodologies to better capture the nuances of assistive PFMT devices.

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SUPPORTING INFORMATION

Additional Supporting Information may be found online in the supporting information tab for this article.

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