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ТИББИЁТДА ЯНГИ КУН НОВЫЙ ДЕНЬ В МЕДИЦИНЕ NEW DAY IN MEDICINE

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INNOVATIVE METHODS FOR MANAGING SEXUAL HEALTH CHALLENGES IN WOMEN WITH NEUROLOGICAL DISORDERS

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✓ Resume

Objective: The state of sexual health plays a crucial role in the overall well-being of women, though it can be significantly affected by complex neurological disorders. In recent years, various methods have been introduced to improve sexual functioning in women dealing with such conditions. This study focuses on implementing specialized approaches to address sexual health concerns in women aged 25 to 66 years (mean age 45 ± 11.6) who are affected by neurological disorders like multiple sclerosis, traumatic brain injury, and stroke, often accompanied by depression. **Methods:** The study involved a group of 133 women experiencing sexual health challenges associated with neurological disorders. Their condition was assessed both before and after the implementation of a comprehensive management plan, using four validated questionnaires. The management strategy included psychotherapeutic support, biofeedback training, transcutaneous tibial nerve stimulation (TTNS), and Kegel device therapy to strengthen pelvic floor muscles. Additionally, counseling was provided to address emotional and psychological aspects linked to chronic illnesses and sexual health concerns. Statistical analysis was conducted to evaluate changes in the questionnaire results, with significance assessed through p-values. **Results:** The intervention yielded significant improvements in key indicators of sexual function and psychological well-being among the participants. Following the implementation of the comprehensive management plan, there was a marked enhancement in sexual function, evidenced by a significant p-value of < 0.0001 . The Mean $\pm$ SD index for female sexual function scores increased from 17.5 ± 4.8 to 21.3 ± 5.6 . Additionally, Beck's test scores demonstrated a significant reduction, decreasing from 24.7 to 15.9. The rate of sexual health concerns improved notably, declining from 35.3 ± 10.8 to 6.1 ± 5.8 . Functional independence scores also rose, from 107.6 ± 19.6 to 117.6 ± 12.2 . These findings underscore the effectiveness of the multidisciplinary management strategy in addressing sexual health challenges and improving mental well-being in women with neurological disorders and depression. Statistical analysis confirms a strong positive relationship between the comprehensive management plan and significant improvements in the outcomes for the study group. **Conclusion:** The results demonstrated that a comprehensive management approach, integrating various disciplines such as physiotherapy, psychotherapy, and psychological support, significantly improved sexual function in women with neurological disorders accompanied by depression.

Key words: female issues related to sexual health, FSDR, FSFI, Beck's Depression Inventory, biofeedback, Kegel device, transcutaneous tibial nerve stimulation.

ИННОВАЦИОННЫЕ МЕТОДЫ РЕШЕНИЯ ПРОБЛЕМ СЕКСУАЛЬНОГО ЗДОРОВЬЯ У ЖЕНЩИН С НЕВРОЛОГИЧЕСКИМИ НАРУШЕНИЯМИ

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✓ Резюме

Цель исследования: Сексуальное здоровье играет важную роль в общем благополучии женщин, однако оно может быть серьезно нарушено при наличии сложных неврологических заболеваний. В последние годы были разработаны методы, направленные на улучшение сексуальной функции у женщин, страдающих такими заболеваниями. Настоящее исследование посвящено внедрению специализированных подходов для решения проблем сексуального здоровья у женщин в возрасте от 25 до 66 лет (средний возраст $45 \pm 11,6$), страдающих неврологическими расстройствами, такими как рассеянный склероз, черепно-мозговая травма и инсульт, которые часто сопровождаются депрессией. **Методы:** В исследовании участвовала группа из 133 женщин, сталкивающихся с проблемами сексуального здоровья, связанными с неврологическими заболеваниями. Их состояние оценивалось как до, так и после реализации комплексного плана управления с использованием четырех валидированных опросников. Управленческая стратегия включала психотерапевтическую поддержку, тренировки с использованием биообратной связи, чрескожную стимуляцию большеберцового нерва (TTNS) и упражнения с использованием устройства Кегеля для укрепления мышц тазового дна. Кроме того, проводились консультации, направленные на решение эмоциональных и психологических проблем, связанных с хроническими заболеваниями и нарушениями сексуального здоровья. Для оценки изменений в результатах опросников проводился статистический анализ с использованием р-значений для определения значимости. **Результаты:** Вмешательство привело к значительным улучшениям ключевых показателей сексуальной функции и психологического благополучия среди участниц исследования. После реализации комплексного плана управления наблюдалось заметное улучшение сексуальной функции, что подтверждено значением $p < 0,0001$. Средний индекс сексуальной функции женщин (Mean $\pm$ SD) увеличился с $17,5 \pm 4,8$ до $21,3 \pm 5,6$. Показатели теста Бека также существенно снизились — с $24,7$ до $15,9$. Частота жалоб на проблемы сексуального здоровья значительно уменьшилась, снизившись с $35,3 \pm 10,8$ до $6,1 \pm 5,8$. Показатели функциональной независимости выросли с $107,6 \pm 19,6$ до $117,6 \pm 12,2$. Эти результаты подчеркивают эффективность многопрофильной стратегии управления в решении проблем сексуального здоровья и улучшении психического состояния женщин с неврологическими расстройствами и депрессией. Статистический анализ подтвердил сильную положительную связь между реализацией комплексного плана управления и значительными улучшениями в показателях группы исследования. **Выводы:** Результаты показали, что комплексный подход к управлению, объединяющий различные дисциплины, такие как физиотерапия, психотерапия и психологическая поддержка, значительно улучшает сексуальную функцию у женщин с неврологическими заболеваниями, сопровождающимися депрессией.

Ключевые слова: женские проблемы сексуального здоровья, FSDR, FSFI, шкала депрессии Бека, биообратная связь, устройство Кегеля, чрескожная стимуляция большеберцового нерва.

NEUROLOGIK BUZILISLARGA CHALINGAN AYOLLARDA JINSIY SALOMATLIK
MUAMMOLARINI HAL QILISH INNOVATION USULLARI

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✓ Rezyume

Tadqiqot maqsadi: Jinsiy salomatlik ayollar umumiy farovonligida muhim rol o'ynaydi, ammo murakkab nevrologik kasalliklar mavjud bo'lganda u jiddiy ravishda buzilishi mumkin. So'nggi yillarda bunday kasalliklarga chalingan ayollarda jinsiy funksiyani yaxshilashga qaratilgan usullar ishlab chiqilgan. Ushbu tadqiqot 25 yoshdan 66 yoshgacha (o'rtacha yosh $45 \pm 11,6$) bo'lgan, ko'pincha depressiya bilan birga kechuvchi, nevrologik kasalliklarga chalingan ayollarda jinsiy salomatlik muammolarini hal qilish uchun maxsus yondashuvlarni joriy etishga bag'ishlangan.

Usullar: Tadqiqotda nevrologik kasalliklar bilan bog'liq jinsiy salomatlik muammolariga duch kelgan 133 nafar ayol ishtirok etdi. Ularning holati kompleks boshqaruv rejasi joriy etilishidan oldin va keyin to'rt validatsiyadan o'tgan so'rovnoma yordamida baholandi. Boshqaruv strategiyasi quyidagilarni o'z

ichiga oldi: psixoterapevtik yordam, bioobrat aloqa yordamida mashg'ulotlar, tibial nervning transkutan stimulyatsiyasi (TTNS), kegel moslamasi yordamida mashqlar orqali tos tubi mushaklarini mustahkamlash. Bundan tashqari, surunkali kasalliklar va jinsiy salomatlik bilan bog'liq muammolar bilan bog'liq hissiy va psixologik muammolarni hal qilish uchun maslahatlar o'tkazildi. So'rovnoma natijalaridagi o'zgarishlarni baholash uchun statistik tahlil o'tkazildi, ahamiyatlilik p-qiymatlari yordamida baholandi. Natijalar: Muolajalar ishtirokchilarda jinsiy funksiyaning va psixologik farovonlikning asosiy ko'rsatkichlarida sezilarli yaxshilanishlarni keltirib chiqardi. Kompleks boshqaruv rejasi joriy etilgandan so'ng jinsiy funksiyalarda sezilarli yaxshilanish kuzatildi ($p < 0,0001$). Ayollarning jinsiy funksiyasi indeksi ($Mean \pm SD$) $17,5 \pm 4,8$ dan $21,3 \pm 5,6$ gacha oshdi. Bek testi ko'rsatkichlari $24,7$ dan $15,9$ gacha sezilarli pasaydi. Jinsiy salomatlik bilan bog'liq shikoyatlar chastotasi $35,3 \pm 10,8$ dan $6,1 \pm 5,8$ gacha sezilarli darajada kamaydi. Funksional mustaqillik ko'rsatkichlari esa $107,6 \pm 19,6$ dan $117,6 \pm 12,2$ gacha oshdi. Ushbu natijalar nevrologik kasalliklar va depressiya bilan og'rigan ayollarda jinsiy salomatlik muammolarini hal qilishda va psixologik holatni yaxshilashda ko'p tarmoqli strategiyaning samaradorligini tasdiqlaydi. Statistik tahlil kompleks boshqaruv rejasi va o'rganilgan guruh natijalaridagi sezilarli yaxshilanishlar o'rtasidagi kuchli ijobiy bog'liqlikni tasdiqlaydi. Xulosalar: Tadqiqot natijalari shuni ko'rsatdiki, fizioterapiya, psixoterapiya va psixologik yordam kabi turli sohalarini birlashtiruvchi kompleks boshqaruv yondashuvi, depressiya bilan kechuvchi nevrologik kasalliklarda ayollarning jinsiy funksiyasini sezilarli darajada yaxshilaydi.

Kalit so'zlar: ayollarda jinsiy salomatlik muammolari, FSDR, FSFI, Bek depressiyasi shkalasi, biofeedback, Kegel moslamasi, tibial nervning transkutan stimulyatsiyasi.

Relevance

The primary contributors to sexual health challenges are physiological factors stemming from lesions in the cortex and spinal cord. These lesions can lead to numbness or abnormal sensations that directly affect the genital region, as well as other issues such as reduced libido and diminished vaginal lubrication in women [1]. Neurological conditions like multiple sclerosis (MS) [2], stroke [3], and traumatic brain injury (TBI) [4] are often associated with sexual dysfunction and emotional distress. Despite their significant impact, these issues are seldom addressed in clinical settings [5]. Post-stroke patients, however, typically receive guidance and resources related to sexuality during rehabilitation, as recommended by clinical guidelines [6,7].

Recent advancements have introduced more targeted strategies for effective rehabilitation. The pelvic floor, a group of muscles supporting the lower abdomen and stabilizing organs such as the bladder, uterus, and intestines [8], plays a critical role. A Kegel device is one such focused strategy, involving exercises that strengthen these muscles by gradually increasing resistance with heavier weights inserted into the vagina [9]. Biofeedback further enhances muscle awareness and allows real-time feedback through visual or auditory cues, enabling both patients and physiotherapists to optimize pelvic floor exercises [10,11].

Transcutaneous tibial nerve stimulation (TTNS) offers indirect benefits for pelvic floor function and may alleviate sexual health challenges in women by enhancing blood flow, strengthening pelvic muscles, and modifying neural activity involved in sexual response. TTNS primarily influences the sacral nerve plexus [12].

The functional independence measure (FIM) assesses disability by evaluating various aspects of personal autonomy, including control over bodily functions, mobility, communication, and social interaction-related cognitive abilities [13,14]. Meanwhile, the female sexual distress scale-revised (FSDS-R), while validated to measure distress associated with impaired sexual ability, is less suitable for comprehensive sexual function evaluation in clinical applications [15].

The Beck Depression Inventory (BDI-2) evaluates symptoms and attitudes such as unhappiness, negativity, feelings of failure, dissatisfaction, guilt, self-blame, and thoughts of suicide. It also identifies physical symptoms like insomnia, fatigue, appetite loss, and decreased arousal, which can exacerbate sexual health concerns [16].

Finally, the Female Sexual Function Index (FSFI) is a brief yet comprehensive tool for assessing sexual function across six dimensions. Its ability to track changes over time makes it invaluable for evaluating the effectiveness of management strategies or the progression of sexual dysfunction. This

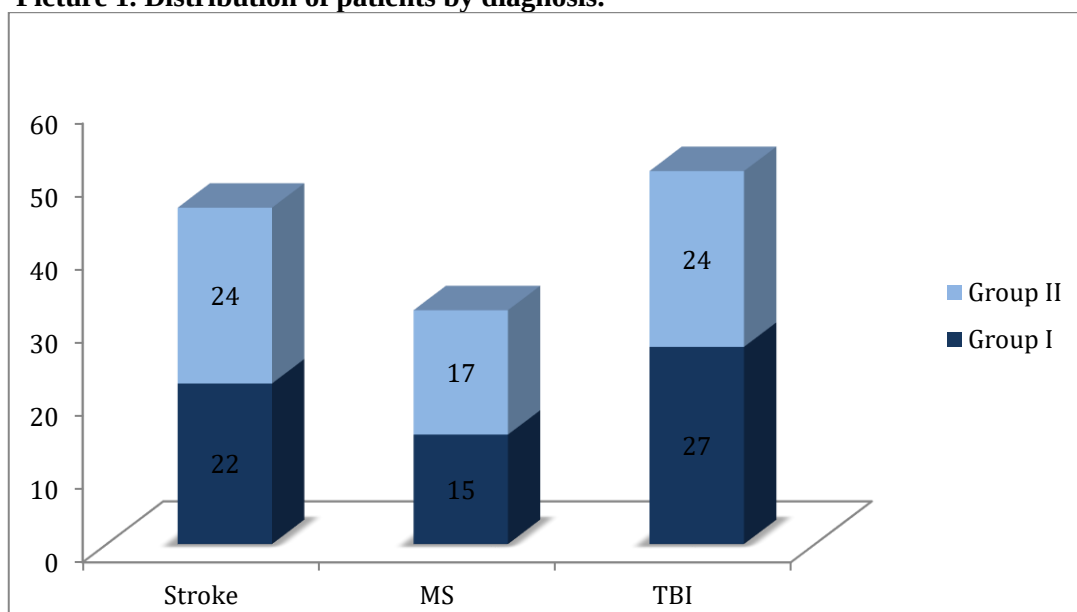
questionnaire provides insights into areas of sexual health that are improving and highlights those requiring additional attention [17-19].

Purpose of the study: To assess the effectiveness of a comprehensive therapeutic intervention plan that includes transcutaneous tibial nerve stimulation (TTNS) and biofeedback therapy, combined with Kegel exercises and psychotherapy, in addressing sexual health concerns in women with neurological disorders.

Material and methods

The study included 133 women who were categorized based on their underlying neurological conditions: 47 with a history of stroke, 33 with multiple sclerosis (MS), and 53 with traumatic brain injury (TBI). Participants were further divided into two groups, with no statistically significant differences between them. The control group consisted of 66 patients (23 post-stroke, 16 MS, and 27 TBI), while the target group included 67 patients (24 post-stroke, 17 MS, and 26 TBI) (pic. 1).

Picture 1. Distribution of patients by diagnosis.



Inclusion criteria: Female participants aged 18-66 years, diagnosed with sexual health issues and one of the neurological disorders (stroke, MS, or TBI).

Exclusion criteria: Patients were excluded if they were less than six months post-stroke, had recurrent MS relapses, severe cognitive or psychiatric impairments, seizure disorders, acute infections, unstable angina, cancer, pacemakers, or autoimmune diseases.

All participants completed a standardized 4-step questionnaire process 4 weeks prior to the initiation of therapeutic interventions. This included the Functional Independence Measure (FIM), Female Sexual Distress Scale-Revised (FSDS-R), Beck Depression Inventory (BDI-2), and Female Sexual Function Index (FSFI). Both groups received management tailored to their specific neurological conditions. The control group participated in psychotherapeutic sessions targeting sexual health concerns and performed daily Kegel exercises.

In addition to the control group's protocol, the target group underwent Biofeedback therapy and transcutaneous tibial nerve stimulation (TTNS). Biofeedback therapy sessions were conducted 15 times on consecutive days, focusing on enhancing brain activity related to sexual responses.

Participants assigned to the TTNS underwent a series of 12 weekly sessions using the TENS EMS NMS60 device. Each 30-minute session involved a pulse duration of 200 microseconds, a frequency of 10 Hz, and an adjustable intensity (0–100 mA) tailored for individual comfort. Electrodes were strategically placed approximately 4–5 cm above the inner ankle bone and near the heel. Intensity was gradually increased until toe movement (flexion or abduction) indicated the motor response threshold, then adjusted to maintain an effective and comfortable sensory response.

Post-intervention, the same four questionnaires were used to evaluate changes in functional independence, sexual distress, depressive symptoms, and sexual function. Statistical analysis compared pre- and post-intervention scores, with p-values determining the significance of observed changes. The study aimed to establish correlations between the comprehensive management plan and improvements in sexual health, with a focus on the additional benefits of Biofeedback therapy and TTNS in the target group compared to the control group.

Statistical analyses were conducted using Microsoft Excel and the Prism 7 software package on a Mac. Advanced mathematical analysis was performed using GraphPad Prism 7. Data with a normal distribution were expressed as $M \pm SD$ (mean $\pm$ standard deviation), and differences were considered statistically significant at a p-value of <0.0001 .

Result and discussions

Before the implementation of the management plan, participants in the control group were assessed using the FSI, FSDS-R, BDI-2, and FIM questionnaires. The baseline results showed no statistically significant differences between groups, with the following values (Table 1).

Table 1. Questionnaire results before management approach.

		Group I n= 66 (49.6%)	Group n= 67 (50.3%)
FSI	with 95% confidence interval	-1.6 to 1.7	
	t-statistics	0.09	
	DF	127	
	p-value	p=0.9257	
FSDS-R	with 95% confidence interval	-3.2 to 4.3	
	t-statistics	0.28	
	DF	127	
	p-value	p=0.7795	
BDI-2	with 95% confidence interval	-2.5 to 0.17	
	t-statistics	-1.7	
	DF	127	
	p-value	p=0.0892	
FIM	with 95% confidence interval	-6.37 to 7.78	
	t-statistics	0.19	
	DF	127	
	p-value	p=0.8439	

Following the 4-week intervention, the target group demonstrated statistically significant improvements across all measured outcomes compared to the control group (Table 2).

Table 2. Questionnaire results after management approach.

		Group I n= 6 (49.6%)	Group n= 65 (50.3%)
FSI	with 95% confidence interval	0.4 to 4.3	
	t-statistics	2.38	
	DF	127	
	p-value	p=0.0184	
FSDS-R	with 95% confidence interval	-25.1 to -21.4	
	t-statistics	-25.55	
	DF	127	
	p-value	p<0.0001	
BDI-2	with 95% confidence interval	-5.4 to -2.7	
	t-statistics	-6.07	
	DF	127	
	p-value	p<0.0001	
FIM	with 95% confidence interval	3.6 to 12.9	
	t-statistics	3.5	
	DF	127	
	p-value	p=0.0005	

The statistical analysis highlights a significant correlation between pre- and post-intervention scores, confirming that the comprehensive management plan is associated with improvements in sexual function, reduced distress, lower depressive symptoms, and enhanced functional independence. Notably, participants in the target group experienced more substantial benefits compared to those in the control group.

Discussion

In many Asian cultures, addressing issues related to sexual health requires not only treatment but also raising awareness and implementing educational initiatives to encourage broader acceptance and understanding of the topic [21].

Studies reveal that depression significantly impacts sexual function and satisfaction, even in individuals not undergoing treatment. Although antidepressant medications often have adverse effects on sexual function, identifying management-related sexual dysfunction remains challenging. Such disruptions can only be reliably assessed through systematic evaluations conducted both before and during treatment [22].

Research on biofeedback therapy has shown its effectiveness in addressing sexual health challenges in women. Combined with pelvic floor muscle exercises, biofeedback significantly improves sexual function, quality of life, and pelvic floor muscle strength compared to control groups [23].

Biofeedback therapy is tailored to the clinical needs of each patient. A typical program includes 15 sessions, each lasting 30 to 45 minutes. Significant improvements and reductions in clinical complaints can be achieved by enhancing the strength of the pelvic floor muscles (levator muscles). It is recommended that sessions be conducted every 1–2 days for optimal results [24].

Conclusion

This study provides compelling evidence that a holistic management strategy, incorporating targeted therapies to address sexual health concerns, alongside Kegel exercises, biofeedback therapy, and transcutaneous tibial nerve stimulation (TNS), significantly enhances sexual function and mental well-being in women with neurological conditions such as stroke, multiple sclerosis (MS), and traumatic brain injury (TBI).

Comparative analysis between the control group, which received standard therapy supplemented with targeted interventions and Kegel exercises, and the target group, which additionally underwent biofeedback therapy and TNS, demonstrated that the latter achieved more substantial improvements in key metrics such as FSFI, FSDS-R, and BDI-2 scores.

These results highlight the necessity of a multidisciplinary approach that addresses sexual health challenges in women with neurological disorders, rather than solely concentrating on the primary neurological condition. Future research should focus on exploring the long-term effects and sustainability of these therapeutic strategies through longitudinal studies.

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