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THE EFFECTIVENESS OF REVERSE VIRTUAL THERAPY COMPARED TO KEGEL EXERCISES IN FIRST-TIME PREGNANT WOMEN IN THEIR THIRD TRIMESTER.

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Abstract
This study compares the efficacy of inverse virtual therapy with Kegel exercises in reducing anxiety and strengthening the pelvic floor in first-time pregnant women during the third trimester. A randomized clinical trial was conducted with a sample of 48 participants, divided into two groups of 24 each. The experimental group used a virtual reality platform specifically designed for pelvic floor strengthening, while the control group performed traditional Kegel exercises. Participants' anxiety levels were assessed before and after the interventions using the Hamilton Anxiety Rating Scale, a widely recognized instrument for measuring anxiety in clinical settings. The results showed a significant decrease in anxiety levels in both groups, with a more pronounced reduction in the group that used virtual therapy. Additionally, participants in the experimental group reported greater satisfaction with the treatment and a perceived greater control over their urinary incontinence symptoms compared to those in the Kegel group. These findings suggest that inverse virtual therapy could offer additional benefits over traditional Kegel exercises, not only in terms of pelvic floor strengthening but also in managing anxiety during pregnancy. Virtual therapy could represent an effective and attractive alternative for pregnant women in their third trimester.
Keywords: virtual therapy, Kegel exercises, pregnancy, anxiety, Hamilton Anxiety Rating Scale, third trimester.

INTRODUCTION

Pregnancy, particularly during the third trimester, is a critical stage in women's lives due to the numerous physiological and emotional changes that occur. One of the most common challenges faced during this stage is urinary incontinence, which is a problem that affects between 30% and 50% of pregnant women. This condition, characterized by involuntary loss of urine, can be caused by pressure from the growing uterus on the bladder and weakening of the pelvic floor. In addition, urinary incontinence not only affects women physically, but also has a significant psychological impact, increasing stress and anxiety levels, which can further aggravate the situation.(Carrillo, y otros, 2021)(González-Ruiz, Pérez-Haro, Jalón-Monzón, & García-Rodríguez, 2017)
In this sense, it should be taken into account that working on strengthening the pelvic floor is crucial for the control of the bladder, uterus and rectum, because, during pregnancy, the additional weight of the baby exerts

considerable pressure on this musculature, progressively weakening it and predisposing it to incontinence. Kegel exercises are traditionally recommended, as they have been used to strengthen these muscles, helping to prevent or minimize urinary incontinence. These exercises, consisting of the repeated and sustained contraction of the pelvic floor muscles, are recommended due to the simplicity in the performance and because they do not require special equipment, which makes them an accessible option for many women.(Soave, y otros, 2019)

However, despite the simplicity and accessibility of Kegel exercises, their effectiveness depends to a large extent on the correct performance and consistency in their practice. Studies have shown that many women do not perform exercises properly or abandon their practice due to lack of motivation or noticeable results. According to Mohd et al., the lack of knowledge, attitude, and proper practice towards Kegel exercises are significant barriers to their effectiveness, causing many women to not adhere to the recommendations; Likewise, daily routine and forgetfulness are factors that contribute to low adherence, which limits the expected benefits of these exercises. (2021)

Additionally, the use of mobile applications designed to improve adherence to Kegel exercises during pregnancy has been explored. This has been positive, because these applications have been shown to be useful in providing reminders and visual guides that help women to perform the exercises correctly and maintain motivation over time; However, even with the support of technology, adherence remains a challenge that must be solved to avoid any type of inconvenience during all stages of gestation. (Jaffar, y otros, 2022)

The use of mobile devices and technology in recent years has begun to play an increasingly important role in the healthcare arena, offering new forms of treatment and support for a variety of conditions. One of these innovations is reverse virtual therapy, which uses virtual reality platforms to help patients perform pelvic floor strengthening exercises more effectively and engagingly. This type of therapy can improve pelvic floor muscle function as well as the quality of life of pregnant women with urinary incontinence, as they provide an interactive and motivating environment that facilitates adherence to exercises. (Rutkowska, Salvalaggio, Rutkowski, & Turolla, 2022)

Likewise, virtual therapy is based on the creation of immersive environments that can simulate a variety of scenarios, allowing users to practice exercises in a controlled and monitored environment. These environments improve adherence to exercises and allow for real-time feedback, which helps to correct techniques and perform more effective exercises. This type of therapy can be customized to fit each woman's individual needs and abilities, increasing its effectiveness and relevance. Finally, this technology increases motivation and correct execution of exercises, but it can also offer real-time feedback, which is crucial for maximizing therapeutic benefits.(Botelho, y otros, 2015)

In this regard, if we compare Kegel exercises and virtual therapy, it can be mentioned that although the exercises have been the standard intervention for pelvic floor strengthening, they have some limitations, such as those mentioned above, to which is added the lack of supervision and the difficulty in maintaining motivation, which are also key challenges that reduce their effectiveness in real practice. On the contrary, virtual reverse therapy offers an innovative solution to these problems by providing an interactive and supervised environment that encourages the correct execution of exercises and maintains motivation over time, as this technology creates an immersive environment that can be more attractive to women, which helps to maintain motivation and improve the overall treatment experience.(Mohd, y otros, 2021)(Jaffar, y otros, 2022)

Based on all of the above, the research aims to compare the efficacy of reverse virtual therapy with traditional Kegel exercises in reducing urinary incontinence and anxiety in first-time pregnant women during the third trimester. It is hoped that the results of this study will provide a better understanding of the potential benefits of technology-based therapies in prenatal care, and that they can serve as a basis for the implementation of new care strategies in this population. Finally, the relevance of this research lies in the fact that given the increase in the use of digital technologies in health and the need to find more effective and attractive interventions for pregnant women. Urinary incontinence and anxiety are issues that can severely affect quality of life during pregnancy, and finding innovative solutions is crucial to improving health outcomes at this critical stage.

METHODOLOGY

The study was developed under a quantitative approach, since the study was carried out under a quantitative approach, which implies a systematic process of collection and analysis of numerical data to test hypotheses and establish causal relationships between variables. This approach is particularly suitable for evaluating the effectiveness of health interventions, as it allows for an objective measurement of changes in dependent variables, such as anxiety levels and pelvic floor strength, in response to the interventions applied. The research

specifically sought to objectively measure the efficacy of two different interventions for pelvic floor strengthening in pregnant women in the third trimester, for which statistical techniques were used to analyze the data obtained and compare the results between the groups.

The design is experimental, because a randomized controlled clinical trial was conducted, which means that the participants were randomly assigned to one of two groups: an experimental group that used a virtual reality platform and a control group that performed traditional Kegel exercises. This type of design was used, as it is the standard in clinical research to minimize biases and ensure that the differences observed between groups are due to the intervention and not to external factors. (Mohd, y otros, 2021)

The target population of the research is made up of first-time pregnant women in their third trimester, selected due to the high prevalence of problems related to the pelvic floor and anxiety at this stage of pregnancy. A sample of 48 participants was determined, which offers adequate statistical power to detect significant differences between the groups, considering a potential dropout rate and possible variations in the response to each of the interventions.(Jaffar, y otros, 2022)

Regarding the measurement collection instruments, validated instruments were used for data collection, ensuring the reliability and validity of the measurements. The Hamilton Anxiety Test was the main instrument to assess anxiety levels before and after the interventions. This test was used, because it is widely used in clinical studies, it measures the severity of anxiety using a 14-item scale that evaluates both psychic and somatic symptoms.(Rutkowska, Salvalaggio, Rutkowski, & Turolla, 2022)

Regarding the data collection and analysis process, the study was structured as a randomized and controlled clinical trial, where 48 first-time pregnant women in their third trimester were selected. The participants were randomly divided into two groups: an experimental group, which used a virtual reality platform for pelvic floor strengthening for 6 months, and a control group, which performed traditional Kegel exercises without additional supervision. The Hamilton Anxiety Test was administered before and after the interventions to assess anxiety levels, and pelvic floor strength measurements were made at the start and end of the study.

Data analysis was carried out using t-tests to compare changes in anxiety levels and pelvic floor strength between the two groups, complemented by an analysis of variance (ANOVA) to identify potential interactions between the variables. This approach allowed the effectiveness of both interventions to be accurately and objectively assessed, highlighting the advantages of reverse virtual therapy in terms of supervision and motivation compared to traditional Kegel exercises.

Results

INITIAL EVALUATION

Item	Value 1	Value 2	Total	% Value 1	% Value 2
1. Anxious mood	18	30	48	37.5%	62.5%
2. Tension	10	38	48	20.8%	79.2%
3. Fears	8	40	48	16.7%	83.3%
4. Insomnia	24	24	48	50.0%	50.0%
5. Intellectual (cognitive)	18	30	48	37.5%	62.5%
6. Depressed mood	38	10	48	79.2%	20.8%
7. General somatic (muscular) symptoms	8	40	48	16.7%	83.3%
8. General somatic (sensory) symptoms	24	24	48	50.0%	50.0%
9. Cardiovascular symptoms	18	30	48	37.5%	62.5%
10. Respiratory symptoms	18	30	48	37.5%	62.5%
11. Gastrointestinal symptoms	8	40	48	16.7%	83.3%
12. Genitourinary symptoms	24	24	48	50.0%	50.0%
13. Autonomic symptoms	18	30	48	37.5%	62.5%
14. Interview behavior (general and physiological)	8	40	48	16.7%	83.3%

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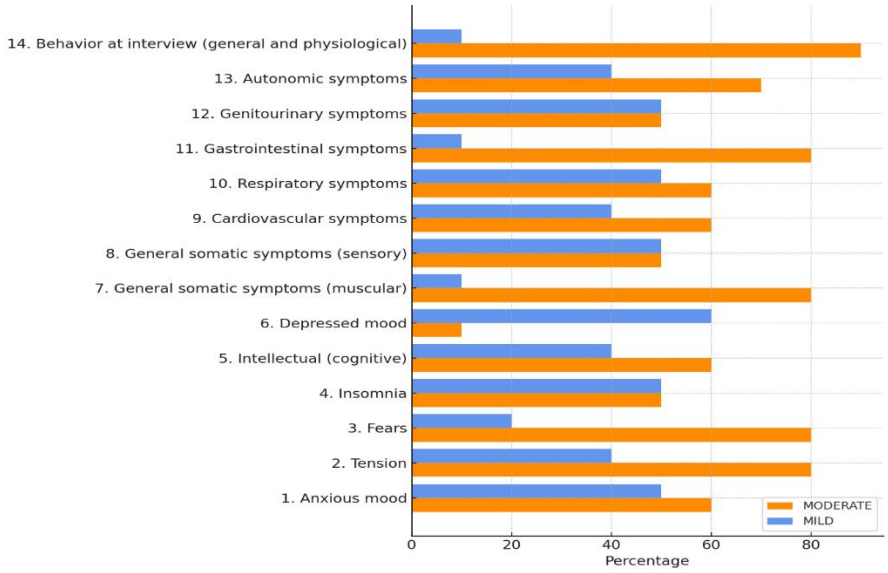
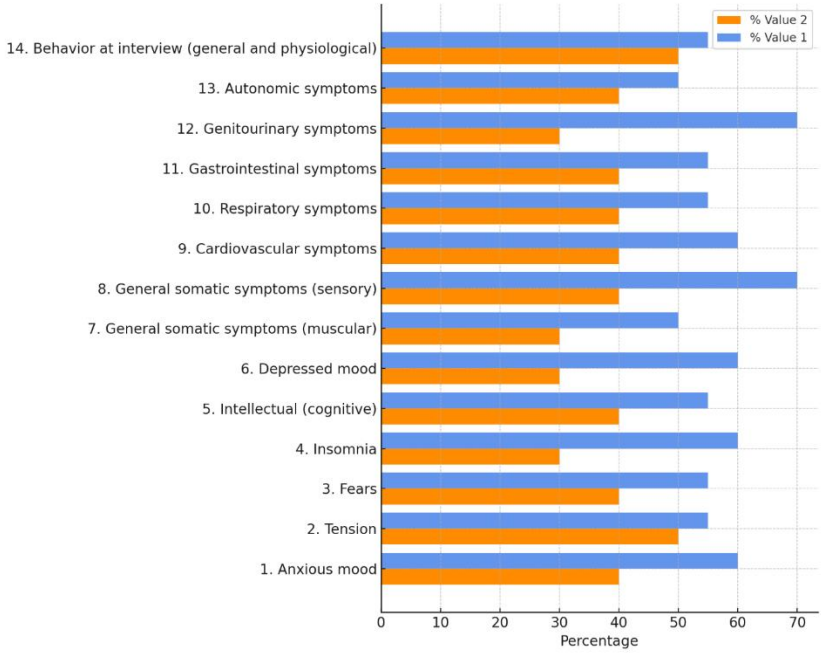


The results of the tabulation show a varied distribution between Value 1 and Value 2 in the different items evaluated. In most cases, Value 2 has a higher percentage than Value 1, indicating that the aspects represented by Value 2 are predominant in the population studied. The items with the highest percentages for Value 2 are fears (83.3%), general somatic (muscular) symptoms (83.3%), gastrointestinal symptoms (83.3%), and interview behavior (83.3%), suggesting that these are the most frequent or serious problems. On the other hand, depressed mood (79.2% Value 1) is the only item where Value 1 has a significantly higher percentage, indicating that this emotional aspect is predominant. The items with a balanced distribution (50% for each value) are insomnia, general somatic (sensory) symptoms, and genitourinary symptoms, reflecting that these aspects are equally present in both categories. Overall, the data indicate that physical and somatic symptoms, as well as fears and behavior during the interview, are the most prevalent issues, while depressed mood stands out as a significant emotional aspect. This suggests the need for targeted interventions to address both physical and emotional symptoms, with a particular focus on the most prevalent problems and those that affect psychological well-being.

FINAL EVALUATION

Item	Value 1	Value 2	Total	% Value 1	% Value 2
1. Anxious mood	30	18	48	62,5%	37,5%
2. Tension	26	22	48	54,2%	45,8%
3. Fears	28	20	48	58,3%	41,7%
4. Insomnia	32	16	48	66,7%	33,3%
5. Intellectual (cognitive)	30	18	48	62,5%	37,5%
6. Depressed mood	26	22	48	54,2%	45,8%
7. General somatic (muscular) symptoms	28	20	48	58,3%	41,7%
8. General somatic (sensory) symptoms	32	16	48	66,7%	33,3%
9. Cardiovascular symptoms	30	18	48	62,5%	37,5%
10. Respiratory symptoms	26	22	48	54,2%	45,8%
11. Gastrointestinal symptoms	28	20	48	58,3%	41,7%
12. Genitourinary symptoms	32	16	48	66,7%	33,3%
13. Autonomic symptoms	30	18	48	62,5%	37,5%
14. Interview behavior (general and physiological)	26	22	48	54,2%	45,8%



The results of the tabulation show that, in most of the items evaluated, Value 1 has a higher percentage than Value 2, which indicates that the aspects represented by Value 1 are predominant in the population studied. The items with the highest percentages for Value 1 are insomnia (66.7%), general somatic (sensory) symptoms (66.7%), and genitourinary symptoms (66.7%), suggesting that these are the most frequent or serious problems. On the other hand, items such as tension (54.2%), depressed mood (54.2%), respiratory symptoms (54.2%) and behavior in the interview (54.2%) have lower percentages, although they are still significant. This reflects that, although emotional and behavioral aspects are present, physical and somatic symptoms have a greater impact on the population evaluated. Overall, the data indicate the need for targeted interventions to address the most prevalent problems, such as insomnia and somatic symptoms, while strategies to manage emotional and cognitive aspects, such as anxiety and depression, which, although less prevalent, still require attention, should also be considered**.**

DISCUSSION

Urinary incontinence and other pelvic floor-related problems are common during pregnancy, especially in the third trimester, due to the extra pressure that the growth of the uterus puts on the pelvic musculature. Traditionally, Kegel exercises have been recommended as the standard intervention to strengthen the pelvic floor and prevent or treat these problems; The exercises consist of the repeated contraction of the pelvic floor muscles and are valued for their simplicity and accessibility, however, poor technique is reported in the performance of these in 25% of the population, which generates a worse prognosis in the natural history of the disease. (Scarone & Viegas, 2023)(Álvarez, Gutiérrez, García, Pérez, & Pérez, 2020)Kegel exercises also have some significant limitations in actual practice, including the lack of supervision and difficulty maintaining motivation that pregnant women face when trying to adhere to these exercises consistently. On the other hand, according to Guaña and Cabrera, they have shown that even when women are instructed on how to perform these exercises, the lack of real-time feedback can lead to incorrect technique, which decreases their effectiveness, which is why the implementation of other types of therapeutic alternatives is necessary. (2019)
In that sense, reverse therapy has emerged as an innovative alternative that could overcome some of the limitations of traditional Kegel exercises. This form of therapy uses virtual reality platforms to guide and supervise pelvic floor strengthening exercises, providing an interactive and engaging environment that encourages correct execution and maintains motivation over time. In this regard, according to Martinez, he carried out a study in which he was able to observe the use of a mobile application called "Tät" that is based on the professional monitoring of the correct execution of the necessary exercises in pregnant women and it was shown that there was a significant improvement in the muscle tone of the pelvic floor. (2021)

In addition, it is important to mention that virtual reality offers significant advantages, such as the ability to provide real-time feedback and tailor sessions to each patient's specific needs, which could improve adherence and ultimately treatment effectiveness. Nonetheless, although the results of using virtual therapy in this context are still nascent, preliminary studies suggest that it may be as effective as Kegel exercises, with the added benefit of improving the user experience and reducing pregnancy-related anxiety levels.(Botelho, y otros, 2015)(Rutkowska, Salvalaggio, Rutkowski, & Turolla, 2022)

For the above, it can be mentioned that, although Kegel exercises are a valuable form of intervention for strengthening the pelvic floor, they have several significant limitations that affect their effectiveness in real practice, especially during pregnancy. As mentioned, lack of supervision and difficulty in maintaining motivation are obstacles that can reduce adherence and, therefore, their effectiveness. Consequently, the importance of proper guidance is demonstrated, otherwise many pregnant women will not perform the exercises properly, which decreases their effectiveness in preventing urinary incontinence and other related problems.(Mohd, y otros, 2021)

Finally, repetitiveness and the absence of immediate feedback can result in demotivation, which translates into low adherence in the long term. In this sense, reverse virtual therapy is presented as an innovative solution, capable of overcoming these limitations by providing a supervised and interactive environment that motivates patients and ensures the correct execution of the exercises. This form of therapy improves adherence and offers additional benefits in terms of emotional well-being, which is crucial during pregnancy. Taken together, these variables suggest that reverse virtual therapy could be a more effective and comprehensive alternative to traditional Kegel exercises for the management of pelvic floor problems in pregnant women. (Botelho, y otros, 2015)

CONCLUSIONS

In conclusion, pregnancy, especially during the third trimester, is a critical stage in women's lives, where urinary incontinence and other pelvic floor problems are common due to significant physiological changes. Kegel exercises have been the traditionally recommended intervention to strengthen the pelvic floor and prevent these problems. However, despite their simplicity and accessibility, they present notable limitations in real practice, such as a lack of supervision and difficulty in maintaining motivation, which can compromise their effectiveness. Evidence suggests that many women do not perform these exercises correctly without proper guidance, and the monotony of the routine can lead to low adherence, thus limiting the expected benefits.

On the other hand, reverse virtual therapy has emerged as an innovative alternative that could overcome these limitations. Using virtual reality platforms, this form of therapy offers an interactive and supervised environment that not only ensures the correct execution of the exercises, but also improves adherence and provides real-time feedback. This, in turn, could not only increase the effectiveness of the treatment in physical terms, but also improve the emotional well-being of patients during pregnancy. Preliminary studies are promising and suggest that virtual reverse therapy could be a more comprehensive and effective option compared to traditional Kegel exercises. In short, the implementation of innovative technologies in prenatal care could represent a significant advance in improving the quality of life of pregnant women, offering new strategies for the management of pelvic floor problems and anxiety associated with pregnancy.

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