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Therapeutic education in patients followed for knee osteoarthritis at Souss Massa University Hospital

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Abstract

Objective: To evaluate the impact of therapeutic patient education (TPE) in patients with knee osteoarthritis, focusing on clinical outcomes and lifestyle changes.

Methods: Thirty-two female patients, aged 45 to 65 years, presenting knee osteoarthritis were included in this prospective cohort and divided into two groups: 16 benefited from TPE carrying on nutrition, weight management and exercise, while 16 did not receive TPE. Clinical assessments included the WOMAC Index, EQ-5D-3L, visual analog scale (VAS) for pain, and levels of activity before and after 4 months of TPE.

Results: A comparison analysis between educated and non-educated patients reveals a significant differences on the practice of physical activity (p=0.004), a significant differences in dietary adoption (p<0.001), an improvement in weight distribution (p=0.69), thus the number of obese patients halved, from 12 to 6. The results reveal a statistically significant reduction in the perception of pain among educated patients (p = 0.023).They also show significant changes in treatments received for knee osteoarthritis.

After TPE the number of patients with a normal WOMAC algofunctional score increased from 2 to 9 patients. The evaluation of the EQ-5D-3L score shows significant changes in patients' quality of life.

Conclusion: The TPE has demonstrated promising results in improving the quality of life of patients with knee osteoarthritis, particularly by enhancing mobility and autonomy and reducing the severity of pain.

Keywords: Knee osteoarthritis; Therapeutic education; WOMAC; EQ-5D-3L; Quality of life

1. Introduction

Knee osteoarthritis (OA) is a chronic joint disease characterized by the progressive degradation of the articular cartilage of the knee, leading to pain, stiffness and significant functional limitation. It represents one of the main causes of

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disability among older people around the world. The prevalence of knee osteoarthritis is continuously increasing, mainly due to the aging of the population and the rise in risk factors such as obesity and previous joint trauma (1).

The impact of knee OA on individuals' quality of life is considerable, affecting not only their mobility and ability to perform daily activities, but also their psychosocial well-being (2). Chronic symptoms such as joint pain can lead to progressive deterioration of patients' mental and physical health, increasing their dependence on medical care and their cost of care (3). In this complex context, patient TPE plays an essential role in the overall management of knee osteoarthritis. TPE encompasses various educational interventions aimed at informing and empowering patients to understand their disease, optimize their treatment and adopt health-promoting behaviors. These interventions often include advice on diet, weight loss and appropriate exercise, all of which are essential to alleviate knee OA symptoms and improve patients' quality of life (4).

Objective

This study aims to measure the effectiveness of TPE in reducing symptoms and improving joint function in patients. It aims also to enhance patients' knowledge regarding their disease and the available treatment options, which should promote their autonomy and encourage active involvement in their health.

2. Patients and Methods

This study is a comparative prospective cohort including 32 female patients with knee OA divided into two groups: 16 patients educated on diet, weight loss and physical exercises and 16 non-educated. The inclusion criteria include female patients, aged 45 to 65 years, presenting radiological stages 1, 2 and 3 of knee osteoarthritis. The exclusion criteria are : the association of other rheumatological pathologies and radiological stage 4 knee osteoarthritis.

An initial assessment was carried out using a questionnaire developed after an in-depth bibliographic search, validated by a senior and tested by five patients to assess understanding of the questions. A resident of the department filled this questionnaire during interviews with patients. A second evaluation was carried out after four months to measure the changes that occurred.

For statistical analysis, the criteria include the assessment of WOMAC and EQ-5D-3L scores, as well as the degree of adherence to the diet, physical activity and treatment, with a evaluation of body mass index (BMI) and VAS for pain in both groups.

Data entry and statistical analysis were performed using the Jamovi software version 2.3.28. The quantitative variables of the Gaussian distribution were expressed as mean and standard deviation, then compared by the T-student test. The qualitative variables were described in terms frequencies and percentages, and then compared by using the Chi-square test or Fisher's exact test, depending on the conditions of application.

3. Results

3.1. Demographic and clinical profile of patients

We observed that the included patients had an average age of 53 years old (+/- 6.67). A large majority were married (78%) and housewives (78%), mainly coming from an urban environment (87.5%). Regarding medical history, 40.6% of patients had no notable history. The duration of evolution of the knee osteoarthritis was 5 to 10 years for 40.6% of patients, with a bilateral prevalence in 75% of them and a radiological stage II in 53%. The vast majority of patients did not resort to a walking aid (90.6%).

3.2. Physical activity: comparison between the educated and non-educated group

In our study, a comparative analysis of the practice of physical activity between educated and non-educated patients for the management of knee osteoarthritis reveals significant differences **(p=0.004).** Before TPE, the majority of non-educated patients were sedentary (6 patients), while only 6 engaged in daily physical activity and 4 patients exercised three times a week. After TPE, these differences were accentuated with a notable increase in the physical activity among educated patients (from 6 to 11 patients), while the number of sedentary patients dropped to zero **(figure 1).**

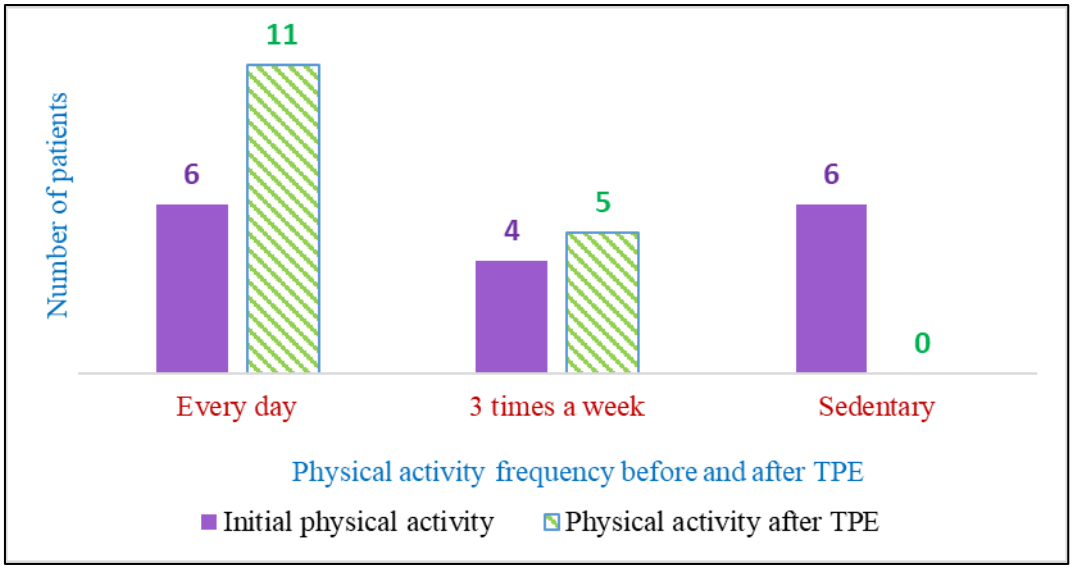

Figure 1 Assessment of physical activity before and after TPE

3.3. Evolution of adherence to the diet before and after TPE

A comparison between educated and non-educated patients demonstrated significant differences in dietary adoption **(p<0.001).** Before TPE, the majority of patients did not follow any specific diet (8 patients), while one patient opted for a low-sodium diet alone and 4 for a low-carbohydrate diet alone. Three patients followed a diet focused exclusively on weight loss.

After TPE, notable changes in dietary habits were observed: no patient maintained the absence of diet. The low-sodium and low-carbohydrate diets alone were no longer followed by any patient and 3 patients maintained a diet for weight loss alone, while the most significant change was the adoption by 13 patients of a combination of the 3 diets (low-sodium, low-carbohydrate and for weight loss) (**Figure 2).**

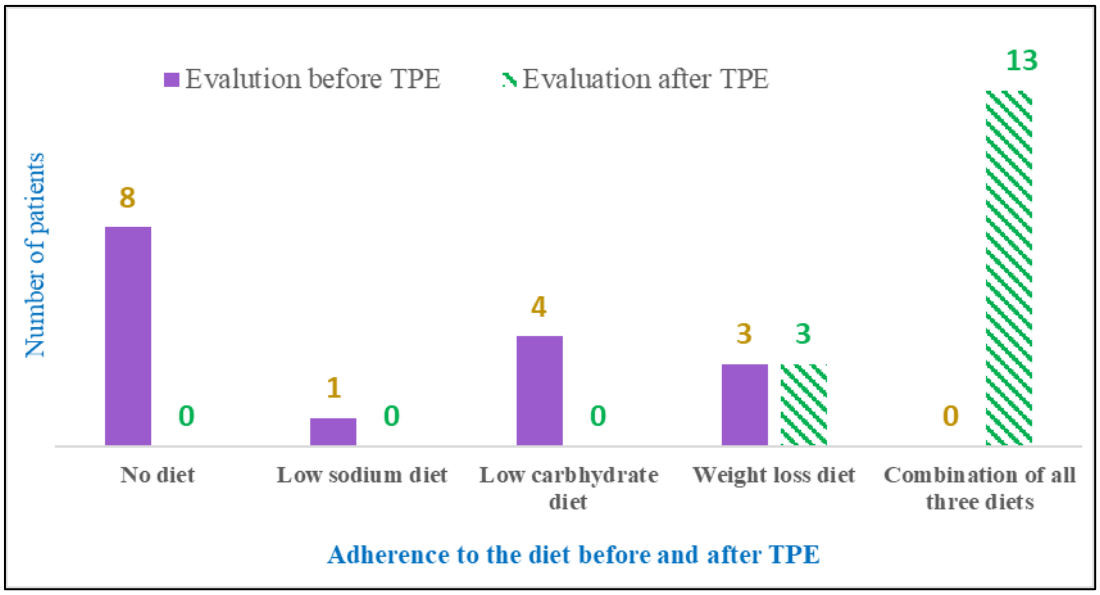

Figure 2 Evaluation of adherence to the diet before and after TPE in the educated group

3.4. Evaluation of Body Mass Index (BMI)

The results of our study reveal a change in the weight distribution of patients with knee osteoarthritis before and after TPE. Before TPE, the majority of patients were classified as obese, with a mean BMI of 31 (+/- 4.45), while only three were overweight and one had a normal weight. After the TPE intervention, an improvement was observed in weight

distribution (p=0.69). The number of obese patients halved, from 12 to 6, while the number of overweight patients increased from 3 to 9. The number of patients maintaining a normal weight remained stable at just one patient (Table 1).

Table 1 Weight assessment before and after TPE

	Weight assessment before TPE	Weight assessment after TPE
Normal weight	1	1
Overweight	3	9
Obesity	12	6

3.5. Evaluation of Visual Analog Scale (VAS)

The evaluation of the VAS for pain before and after the TPE reveals a statistically significant reduction in the perception of pain among educated patients (p = 0.023). Before TPE, no patient reported a complete absence of pain (VAS 0), the majority presenting moderate to severe pain (8 moderate, 5 severe), with only 3 patients experiencing mild pain. After TPE, a notable improvement is observed: the number of patients without pain (VAS 0) increased to 4, and those experiencing mild pain increased considerably (from 3 to 8). Only one patient still reported moderate pain and three had severe pain (Figure 3).

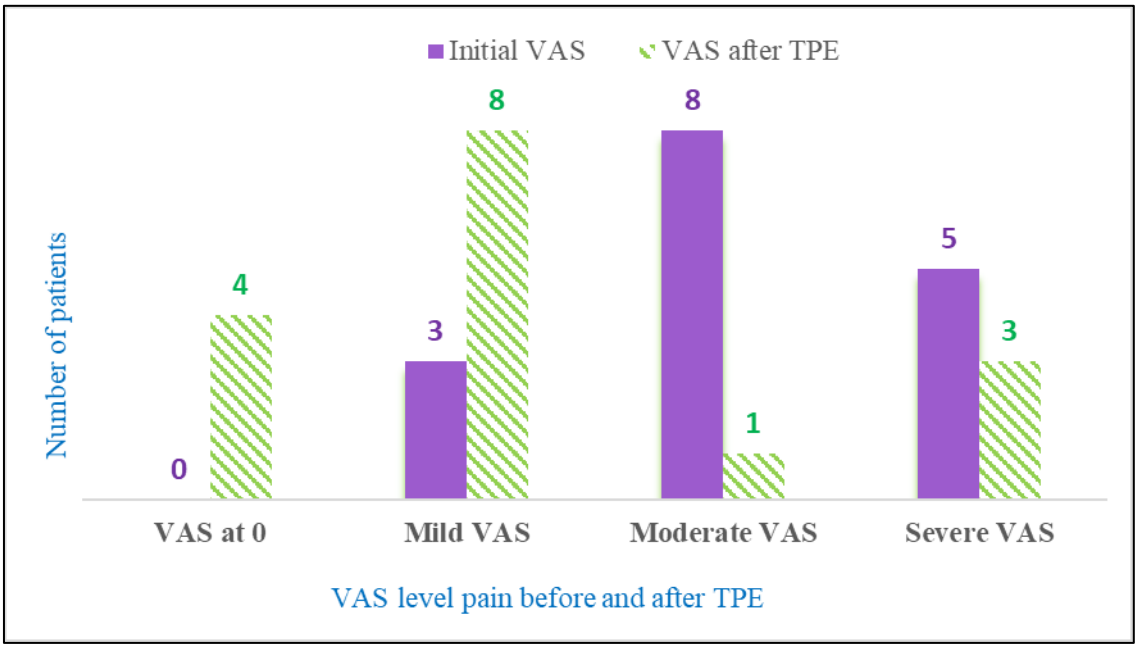

Figure 3 Evaluation of pain VAS before and after TPE

3.6. Comparative analysis of treatments received for knee osteoarthritis:

The study examines the evolution of treatments administered to patients with knee osteoarthritis before and after their participation in a TPE program. Initially, 7 patients used only antiarthritic medications and 6 analgesic treatments. Three patients combined the two and only one had received local steroid injection. No patient had received viscosupplementation or total knee arthroplasty (TKA). After 4 months of TPE, the results show significant changes: the exclusive use of antiarthritic increased from 7 to 13 patients, while the exclusive use of analgesics was eliminated. The combination of antiarthritics and analgesics decreased slightly from 3 to 2 patients, and the use of local steroid injection remained the same with one patient before and after TPE. Viscosupplementation remained unused (Table 2).

Table 2 Evaluation of treatments received before and after TPE

	Number of patients before TPE	**Number of patients after TPE**
Anti-arthritics alone	7	13
Analgesic alone	6	0
Anti-arthritics and analgesic association	3	2
Steroid injection	1	1
Viscosupplementation	0	0

3.7. Evaluation of WOMAC algofunctional score before and after TPE

In this comparative study using the WOMAC Index score before and after TPE, the results showed significant improvement in patients with knee osteoarthritis. Before TPE, the majority of patients had a WOMAC score indicating an abnormal condition (score > 13), with 14 patients affected, while only 2 patients had a score in the normal range (between 0 and 12). After TPE, a positive development was observed: the number of patients with a normal WOMAC score increased to nine, demonstrating a reduction in pain, stiffness as well as an improvement in physical function. At the same time, the number of patients with an abnormal WOMAC score decreased to 7, indicating an improvement in symptom management for a portion of patients (Figure 4).

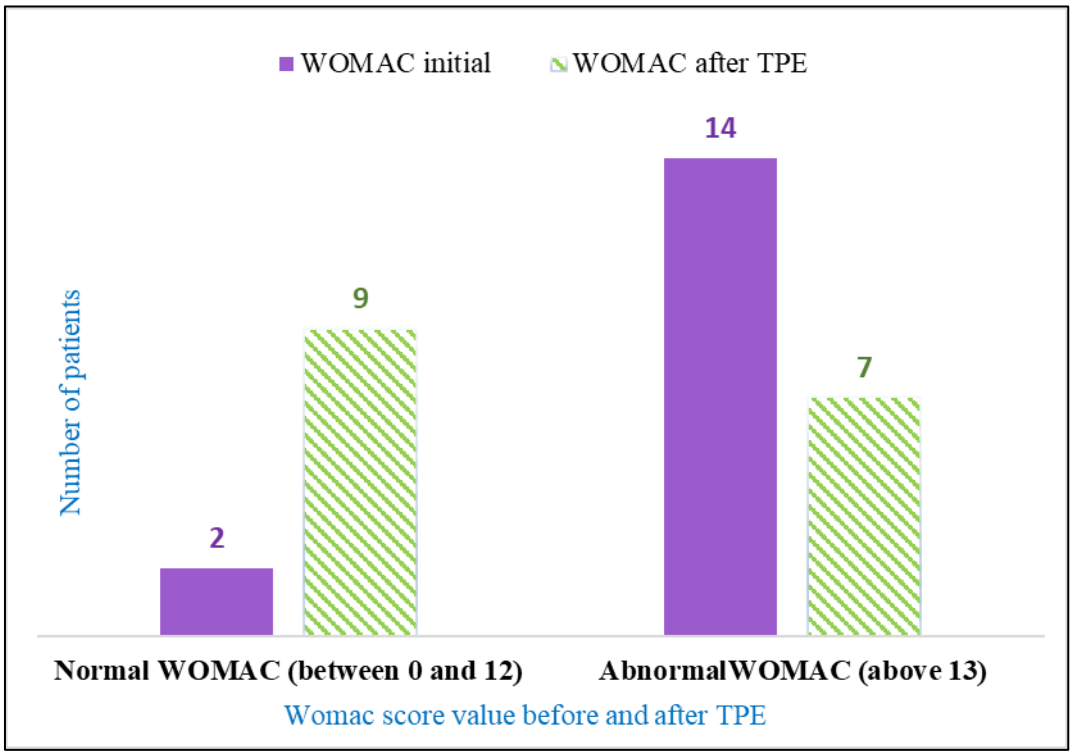

Figure 4 Evaluation of the Womac score before and after TPE

3.8. Impact of therapeutic education on the EQ-5D-3L score

The evaluation of the EQ-5D-3L score before and after the TPE shows significant changes in several dimensions of the patients' **quality of life** (Mobility, autonomy, current activities, pain/discomfort, anxiety and depression) **(figure 5).**

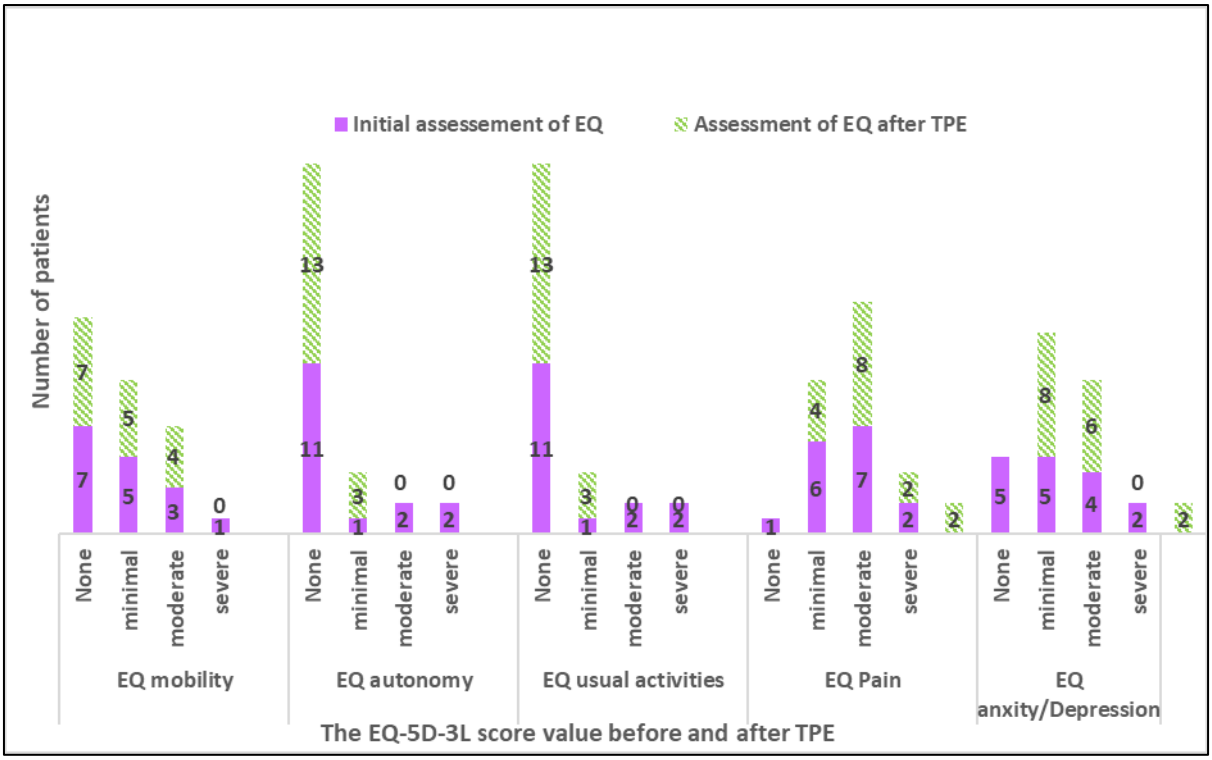

Figure 5 Evaluation of the EQ-5D-3L score before and after TPE

4. Discussion

4.1. Demographic and clinical profile of patients

Our study results provide a detailed overview of the demographic and clinical profile of patients with knee OA, highlighting several key characteristics. The mean age of the patients was 53 years with a standard deviation of 6.67 years, indicating a relatively homogeneous cohort in terms of age. The average body mass index (BMI) was 31 kg/m² with a standard deviation of 4.45, highlighting a significant prevalence of overweight among the patients studied.

From a sociodemographic perspective, a large majority of patients, 78%, were married, while 78% were housewives. The majority resided in urban areas (87.5%), which can influence access to care and health programs. Approximately 40.6% of patients had no significant medical history, which may indicate a relatively healthy cohort despite the presence of knee osteoarthritis.

Regarding the disease itself, the duration of progression was most frequently between 5 and 10 years for 40.6% of patients, reflecting a fairly long history of the disease. Knee OA was bilateral in 75% of patients and was classified as radiological stage II in 53% of them, which reflects moderate damage to the knee joints. Regarding therapeutic interventions, the vast majority of patients (90.6%) did not use a walking aid, which could reflect the ability to maintain minimal functionality despite disease progression.

4.2. Engagement in physical activity: comparison between the educated and non-educated group

To discuss physical activity in educated and non-educated patients, in the management of knee osteoarthritis, our study reveals significant results comparable to other research. Before TPE, the higher prevalence of sedentary lifestyle among non-educated patients is consistent with previous studies which demonstrate less engagement in physical exercise among individuals less informed about the management of their condition (5). Conversely, our study shows that educated patients adopted daily physical activity more significantly after TPE, compared to non-educated ones, which reflects the potential benefits of TPE on engagement in favorable health behaviors (6). This persistent difference suggests that educational intervention may play a crucial role in promoting an active lifestyle, essential for the effective management of knee OA and the preservation of long-term joint function. Along the same lines, previous studies have shown that regular exercise can reduce pain and improve physical function in patients with knee OA (7).

4.3. Assessment of adherence to diet before and after TPE

A comparative analysis between the educated and non-educated group revealed statistically significant differences in the adoption of a suitable diet **($p<0.001$).** Before TPE, the majority of patients did not follow any specific diet, while after the TPE, a transition towards structured and diversified dietary practices was observed, often including a combination of low-sodium, low-carbohydrate and weight loss diet. The results of our study are consistent with several previous researches that have examined the effect of TPE on the eating habits of patients with chronic diseases. For example, a study observed a significant improvement in adherence to recommended diets after a similar educational intervention in patients with type 2 diabetes (8). Similarly, a recent meta-analysis on TPE in chronic disease management demonstrated increased compliance with dietary recommendations, leading to improved overall health outcomes (9).

In our study, the increase in the adoption of suitable diets after TPE suggests that this educational approach can play a crucial role in promoting healthier eating habits that are better adapted to the individual needs of patients with knee OA. This could potentially reduce the disease symptoms and improve quality of life in the long term.

4.4. Impact of TPE on the Body Mass Index (BMI)

Our study showed a significant improvement in patient weight distribution after TPE, with a notable reduction in the number of obese patients and a proportional increase in overweight patients. This suggests that TPE played a crucial role in promoting beneficial changes in weight management in these patients, potentially improving their general health and well-being.

Our results are consistent with those reported in the literature (10), which highlights the effectiveness of TPE in terms of weight and BMI reduction, especially in the short term. Furthermore, improving knowledge and developing skills in self-care, especially with regard to nutrition and physical activity, are particularly important aspects(10).

Similar results have been observed in other studies investigating the impact of TE programs on weight management in populations with various chronic diseases. For example, a systematic review highlighted that educational interventions can induce significant changes in eating habits and contribute to improved weight management in patients with chronic diseases (8).

Another studies has shown that the weight loss was of 8.6% and the global health costs were decreased by 15.8% (11).

Similarly, a research also confirmed that TPE can play a crucial role in promoting healthy lifestyles and weight management in the context of chronic diseases (9).

Our results support these conclusions by demonstrating that TPE can not only positively influence eating habits and weight management, but also have a direct impact on clinical outcomes in patients with knee OA. The reduction in obesity and the stabilization of normal weight in our study indicate better management of the physical condition of patients.

4.5. Pain intensity assessment before and after TPE

The results of our study highlight the positive impact of TPE on pain management in patients with knee osteoarthritis, confirming a significant reduction in perceived pain levels after the intervention. Before TPE, the majority of patients suffered from moderate to severe pain, with a few reporting no pain at all. After TPE, a notable increase in the number of patients reporting a complete absence of pain was observed, accompanied by a decrease in the number of patients experiencing moderate to severe pain. Our observations are consistent with previous studies that have also highlighted the benefits of educational programs in pain management among patients with similar chronic conditions, such as osteoarthritis (12). These studies have highlighted that education improves pain perception by strengthening coping strategies and promoting better daily symptom management.

Despite these encouraging results, the persistence of moderate to severe pain in some patients after TPE highlights the need for personalized and ongoing approaches to optimize long-term pain relief. Complementary strategies, such as regular follow-ups and individualized therapeutic adjustments, could be explored to meet the specific needs of patients and improve their quality of life in the long term.

4.6. Comparative analysis of treatments received for knee osteoarthritis

The comparative study of treatments in patients with knee osteoarthritis before and after TPE highlights significant changes in therapeutic choices and their clinical implications. After TPE, analysis reveals a notable increase in the exclusive use of anti-arthritis medications, a total elimination of analgesic treatments alone, and a slight decrease in the combined use of anti-arthritic medications and analgesics. Furthermore, the use of local steroid injections remained the same, while viscosupplementation remained unused in this cohort.

These results suggest that TPE plays a crucial role in optimizing therapeutic choices for knee OA. It seems to promote better management of knee osteoarthritis symptoms and a reduction in dependence on isolated analgesics. This evolution towards more targeted and adapted treatments could potentially improve clinical outcomes and patients' quality of life in the long term.

Previous research has shown that educational programs on pain management and treatment optimization can significantly improve functional outcomes and reduce the need for invasive pharmacological interventions (13). In addition, other work has highlighted the effectiveness of educational interventions in reducing pain and improving adherence to non-pharmacological treatments, thus contributing to better management of the disease (14).

4.7. Assessment of WOMAC algofunctional score before and after TPE

Our study used the WOMAC score to assess the impact of TPE on female patients with knee osteoarthritis, revealing encouraging results regarding the improvement of symptoms and participants' quality of life. After the educational intervention, a substantial reduction in the number of patients with an abnormal WOMAC score was observed, with an increase in patients with normal score.

These results are consistent with other studies which have also shown the benefits of TPE in the management of osteoarthritis. For example, a study reported significant improvement in WOMAC scores after a TPE program focused on pain self-management and improved physical function (15). Similarly, a meta-analysis concluded that educational interventions are effective in reducing pain and improving functionality in patients with osteoarthritis (16).

The observation that TPE can contribute to better symptom management in patients with osteoarthritis is particularly relevant to clinical practices. By providing information on self-care, appropriate exercise strategies, and coping techniques, TPE may help reduce the need for aggressive and potentially invasive pharmacological treatments. A randomized controlled trial demonstrated that education of patients with osteoarthritis is feasible in a primary care setting and can improve health perception as well as function to some extent. The program included education rather than instruction on exercise (17). Another systematic review and meta-analysis of randomized controlled trials investigating the effectiveness of patient TPE interventions for chronic diseases found that these TPE interventions were effective in improving biological outcomes, treatment adherence, knowledge, self-efficacy and psychological health. This efficiency was consistent regardless of TPE format (individual, group and electronic) and healthcare providers (non-specialists vs specialists) (18).

4.8. Impact of TPE on the EQ-5D-3L score

The current study on TPE in patients with knee osteoarthritis shows promising results evaluated by the EQ-5D-3L score. Before TPE, the majority of patients had significant limitations in mobility, independence, daily activities and experienced moderate to severe levels of pain or discomfort. After the TPE intervention, notable improvements were observed in these areas, including an improvement in mobility and in independence, as well as a decrease in severe levels of pain or discomfort. These results are consistent with previous studies which have also shown that TPE improves symptom management and quality of life in osteoarthritis patients. For example, research has shown that TPE programs reduce pain and improve physical function in patients with osteoarthritis (9). Additionally, a recent meta-analysis confirmed the benefits of educational interventions in the management of chronic diseases, including osteoarthritis (16). Other studies suggest that educational interventions can improve physical limitations, reduce pain, and potentially decrease health care costs for patients with osteoarthritis. However, effectiveness varies depending on the type of intervention and the sustainability of the effects remains a question to be explored (12).

4.9. Limitations of the study

This study has limitations that should be considered when interpreting the results. First of all, the sample size is relatively small with only 32 patients divided into two groups. A smaller sample size may limit the ability to generalize findings to a broader population and may also affect the statistical power of the study, making it difficult to detect significant differences between educated and non-educated groups.

Additionally, the relatively short follow-up duration of four months may not be sufficient to fully capture the long-term effects of TPE on clinical outcomes and recommendation adherence. Patients with knee OA may have chronic disease trajectories that require assessment over a more prolonged period to assess the true long-term effects of educational interventions.

Regarding potential bias, it remains possible that recall or memory bias influenced patients' responses at baseline and follow-up assessments. Furthermore, the fact that the assessment was carried out by a resident of the department could introduce assessment bias, particularly in terms of subjectivity in the interpretation of patients' responses.

4.10. Clinical implications of TPE in rheumatology

The clinical implications of integrating TPE into daily rheumatology practice are broad and promising, as suggested by this comparative prospective study on knee osteoarthritis (19). Indeed, TPE offers several tangible advantages which can enrich the care of patients suffering from chronic rheumatological diseases, such as knee osteoarthritis.

First, TPE helps improve patients' understanding of their illness, including clarifying risk factors, self-care strategies, and available treatment options. This promotes active participation of patients in the daily management of their condition, making them partners in the medical decision-making process (20). By integrating advice on diet, weight loss and appropriate exercise, as the study shows, TPE can not only reduce dependence on analgesic medications, but also improve joint function and reduce disease progression (21). This can lead to a significant improvement in patients' quality of life, allowing them to maintain increased mobility and independence in the long term.

Furthermore, by strengthening patient self-management skills, TPE can potentially reduce unplanned medical consultations and hospitalizations related to knee OA, thereby decreasing healthcare costs and optimizing the use of available resources (22).

In practical terms, rheumatologists and other healthcare professionals can integrate structured TPE programs into their regular consultations, providing patients with practical information and tools to better manage their health conditions on a daily basis. This requires a long-term commitment to the training and continuous education of healthcare professionals to ensure effective and consistent implementation of these programs (23).

The list of abbreviations

BMI	**Body Mass Index**
EQ-5D-3L	EuroQol-5 Dimensions-3 Levels
RHC	Regional Hospital Center
UHC	University Hospital Center
TPE	Therapeutic patient education
VAS	Visual Analog Scale
WOMAC	Western Ontario and McMaster Universities Osteoarthritis Index

5. Conclusion

This study of TPE in patients with knee OA revealed significant improvements in health and quality of life. After the intervention, notable improvements were observed, with a reduction in severe limitations and better pain management. Additionally, TPE promoted beneficial changes in patients' lifestyle habits, such as increased regular physical activity and adoption of healthier diets, thereby contributing to better weight management and overall improvement of health. These results highlight the crucial importance of TPE in the management of osteoarthritis, not only for its immediate effects on symptoms and physical function, but also for encouraging a healthy lifestyle in the long term.

Recommendations for future research or clinical applications

To guide future research and clinical applications based on the conclusions of this study on TPE in patients with knee osteoarthritis, several recommendations can be considered:

- Continuing with longitudinal studies including a larger sample of patients over a prolonged period would make it possible to better evaluate the long-term effectiveness of TPE.
- Explore the effects of TPE on different subgroups of patients, such as different age groups, stages of severity of knee OA, and associated comorbidities, to understand which populations benefit the most from this type of education.
- Compare the effectiveness of TPE with other approaches to managing knee OA, such as medical treatments, surgical interventions or physical therapies, to determine its optimal role in an integrated treatment plan.
- Adapt TPE programs to take into account the diverse cultural, social and economic contexts of patients, in order to maximize adherence and positive outcomes.
- Explore the use of digital technologies such as mobile applications, online platforms to facilitate accessibility and continuity of care.
- Evaluation of the economic impact of TPE in terms of reducing health care costs associated with the management of knee OA, including medical visits, hospitalizations and medications.
- Integrate TPE training into continuing education programs for health professionals, in order to strengthen their capacity to effectively implement and support these interventions in clinical practice

Compliance with ethical standards

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Disclosure of conflict of interest

All authors declares that they have no personal conflicts of interest that could influence the results or interpretations presented in this article.

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Contribution of the authors

All authors contributed to the development of this work.

Statement of Ethics approval

This study was approved by the university hospital Souss Massa research team. All participants were informed about the study's objectives and the procedures involved.

Statement of informed consent

Informed consent was obtained from all participants prior to their inclusion in the study. Participants' personal data were anonymized to ensure confidentiality.

Approval from a local ethics committee

Moroccan law 28/13 on the protection of individuals participating in research does not require an ethics committee for non-interventional studies such as ours.

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