

The effectiveness of the application of green clay in padelistas with chronic muscle pain

A eficácia da aplicação da argila verde em padelistas com quadro de dores musculares crônicas

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ABSTRACT

BACKGROUND AND OBJECTIVES: Padel is a sport on the rise in the world and requires a high repetition of movements, which can lead to the development of pains. The main function of pain is to inform the central nervous system of the existing problem in the body. Following this, geotherapy is an integrative and complementary non-invasive practice that allows the treatment of pain, inflammation, and other musculoskeletal problems. Therefore, this research was developed to verify the perception of chronic pain in amateur padel players before and after the application of green clay.

METHODS: The present study is a qualitative-quantitative field study with a semi-structured questionnaire, including 20 participants, 10 from the Control Group (CG) and 10 from the Treatment Group (TG). Pain intensity was assessed by the visual analogue scale (VAS). For the analysis, the data were tabulated in the excel platform, with a significance level of 5% ($p < 0.05$).

RESULTS: There was statistical significance with the use of geotherapy with green clay for the relief of chronic muscle pain in padel players.

CONCLUSION: The application of green clay demonstrated efficacy in reducing chronic pain in padelistas, yet other variables can be evaluated in future studies.

Keywords: Chronic pain, Complementary therapies, Geotherapy, Padel.

RESUMO

JUSTIFICATIVA E OBJETIVOS: O padel é um esporte em alta no mundo e exige a repetição de movimentos, podendo levar ao desenvolvimento de dores localizadas. A função principal da dor é informar o sistema nervoso central da problemática existente no organismo. Para o tratamento dessas dores, a geoterapia é uma prática integrativa e complementar não invasiva que possibilita o tratamento de incômodos algícos, inflamações e outros problemas musculoesqueléticos. Desta forma, essa pesquisa foi desenvolvida com o objetivo de verificar a percepção da dor crônica em padelistas amadores antes e depois da aplicação da argila verde.

MÉTODOS: Trata-se de um estudo de campo de caráter qualitativo-quantitativo, com um questionário semiestruturado, incluindo 20 participantes distribuídos em Grupo Controle (GC) e Grupo Aplicação (GA). A intensidade da dor foi avaliada pela Escala Analógica Visual (EAV). Os dados foram tabulados em planilha de cálculo e a análise estatística foi realizada pela ANOVA com nível de significância de 5% ($p < 0,05$).

RESULTADOS: Houve diferença significativa entre os dois grupos estudados, sendo que o uso da geoterapia com a argila verde promoveu o alívio de dores musculares crônicas em padelistas.

CONCLUSÃO: A aplicação da argila verde demonstrou eficácia na redução de dores crônicas em padelistas amadores, ainda assim outras variáveis podem ser avaliadas em futuros estudos, como a melhora a longo prazo e possíveis efeitos colaterais.

Descritores: Dor crônica, Geoterapia, Padel, Terapias complementares.

INTRODUCTION

Padel is a sport that is expanding worldwide. Recently, there has been an increase in the number of courts and practitioners, with more than 40 countries joining the sport. It is a sport that contributes to promoting healthy habits and increasing quality of life¹. Padel is similar to the game of tennis, in which a small ball is thrown, and the player must hit the ball with a racket. The difference between the two disciplines is the size of the courts, the existence of walls in padel, and the fact that it is played exclusively in doubles, which makes it easier and simpler to play and learn¹.

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HIGHLIGHTS

- The average final pain intensity of the intervention group was reduced in all the regions reported.
- Comparing the mean final pain intensity values, there was a significant 58.7% reduction in pain between both groups after eight weeks.
- This study showed an improvement in intervention group's pain, both in relation to the control groups and in relation to the initial week.

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Considering that this is a sport in which the practice requires repetition of movements, the activity should be complemented with training that stimulates cardiorespiratory and muscular endurance¹. Even so, in this sport there is a high possibility that the paddle tennis player will not achieve the right movement and thus develop pain¹.

As mentioned by the International Association for the Study of Pain (IASP), pain is a delicate experience that affects an individual's sensory and emotional areas, and may be related to an actual or potential tissue injury (IASP apud Vasconcellos FH2)². The main function of pain is to inform the central nervous system of problems in the body, and when it persists for more than three months, it is considered chronic². Information about changes in the body is transmitted through nerve stimuli, which begin when the painful episode is transformed from aggressive impulses into action potentials and, through peripheral nerve fibers, is transported to the central nervous system³.

The condition of chronic pain can have a number of impacts on personal, social and professional life, and even incapacitate the individual⁴. In this context, other treatments, such as the implementation of health education projects in conjunction with drugs, have shown good results in this condition⁴.

In this context of other treatments, integrative and complementary practices (ICPs), in addition to being ancient practices, support the treatment of diseases and help restore balance in the body⁵.

Geotherapy, a non-invasive ICP, makes it possible to treat pain, inflammation and other musculoskeletal problems⁶. According to the author⁶, "its use is traditionally applicable to pain and physical discomfort". Therefore, in its therapeutic nature, the application of clay (geotherapy) has positive effects in the treatment of imbalances and chronic conditions, resulting in the relief of pain and edema in affected limbs⁶.

Clay comes in different colors (green, pink, white, red, among others) and is chosen according to the type of objective set in the treatment to be developed, as well as its physical and chemical characteristics^{5,6}. The clay material is diluted in water and manipulated until it forms a homogeneous composition, or colloid mass⁵.

Green clay is the result of various chemical compositions and external factors, such as weathering⁶. According to the author⁶, "green clay is a consequence of isomorphic substitutions, it is part of the hydromica group, which is originated from alkaline solutions containing Ca⁺⁺, Mg⁺⁺ and Fe⁺⁺, formed from a poorly drained environment with a neutral to alkaline pH and rich in cations, cold temperate and semi-arid climatic conditions^{6"}.

Based on the above, the present study's objective was to verify the perception of chronic muscle pain in amateur padel players before and after the application of green clay.

METHODS

This was a qualitative-quantitative field study using a semi-structured questionnaire with open and closed questions, which encouraged participants to specify their reports of pain and the effect of geotherapy.

The study is in accordance with the Declaration of Helsinki of the World Medical Association, respecting Resolution No. 466/12 of the National Health Council, which determines the Guidelines and Regulatory Norms for Research in Experimental Units Involving Human Beings, using the Free and Informed Consent Term (FICT) as a document of free agreement for the research participant. As such, the research project was assessed by Univille's Research Ethics Committee, CAAE number 53389921.0.0000.5366.

The research site was the G3 Padel Academia, between April and May 2022.

The research participants were selected according to the inclusion criteria: amateur padel players at the research site, aged over 18, including men, women and/or non-binary people, with chronic muscle pain in any muscle area of the body. Participants were excluded if they reported no pain or less than three months, pain exclusively in non-muscular areas, open wounds in the painful area or if they had contraindications to green clay treatment.

The sample consisted of 20 participants, randomly divided into two groups, with the last 10 enrolled in the Control Group (CG) and the other 10 in the Application Group (AG). In the latter, geotherapy was applied using green clay always on the day the participant was doing their padel training. It should be noted that no participants were excluded during the study.

After agreeing to take part in the study, all the participants answered the questionnaire, which registered the intensity of local pain using the visual analogue scale (VAS), the participant's age, area of pain, whether they used any drugs or other pain-relieving practices and the course of their padel training.

The questionnaire was reapplied every week for 8 weeks for both groups, with the AG reapplying it after applying the clay. Thus, AG had eight geotherapy applications, carried out at the study site, in an exclusive environment for individualized care. The sessions took place over eight consecutive weeks, without a break, and lasted one hour.

Geotherapy was carried out using green clay with added water at a temperature of 30 °C and mixed with a stainless-steel spoon to obtain a colloidal mass with a mousse-like texture.

The AG treatment was carried out in the following sequence: the participant indicated the sore spot and exfoliation was carried out by lightly rubbing it with gauze moistened with water. The area was then covered with open gauze. The clay was applied to the gauze, to a thickness of approximately 2.5 cm, at a temperature of 30 °C, and again covered with gauze.

The clay was kept in contact with the sore area for 40 minutes. At the end of the time, all the clay material was removed from the participant with the help of gauze, moistened absorbent cotton and dry paper towels.

The data collected through the questionnaire was tabulated using the Google Forms service in a form developed in the tool itself. To analyze the data on the location and intensity of pain, a qualitative variable, a body diagram was drawn up indicating the pain points.

The quantitative data was statistically analyzed using the ANOVA test and a p-value was determined to indicate significant differences (p<0.02).

RESULTS

The sample consisted of 20 amateur paddle tennis players, 9 (45%) female and 11 (55%) males, aged between 20 and 56, with an average age of 38. Of all the participants, 25% reported using analgesic drugs and 20% anti-inflammatory drugs.

The majority of the participants (60%) reported using another therapy when they experienced severe pain or discomfort. A total of six practices were mentioned, with massage being the most popular (40% of participants), followed by stretching (10%), heating pads (5%), physiotherapy (5%) and cupping therapy (5%).

Twelve body areas related to chronic muscle pain, ranging in intensity from zero to 10 (VAS), were recorded throughout the study period. Table 1 shows the body regions reported as painful, the number of participants who complained of pain in the region, the average initial pain intensity value in the reported region (CG + AG) and the average pain intensity value at the end of the eighth week for CG and AG.

Pain was reported in most of the locations represented in the anatomical figure, with the exception of the head, abdomen and anterior tibial. The average final AG pain intensity was reduced in all the regions reported. However, the average intensity of the final GC pain was variable, with a reduction in the trapezius, lumbar, calf and forearm regions. The other regions either had no change in average pain or an increase.

Comparing the mean final pain intensity values (Table 1) there was a significant 58.7% reduction in pain between the CG and AG groups after eight weeks. Figure 1 shows the average pain intensity of the CG and AG for the beginning and end of the research period. Before each application, the AG group responded to the VAS, thus generating the pre-application values. After the application of green clay, this group responded again to the VAS, generating the post-application data.

Figure 1 shows that the CG group had no change in pain intensity, remaining the same between the 1st and 8th weeks, while the AG group showed a 64% reduction in pain intensity after the

application of geotherapy for a period of 8 weeks. When comparing the AG from the first week to the eighth week, the $p < 0.02$ value was obtained, indicating that there was a statistically significant difference. Making the same comparison in relation to the CG group, the $p > 0.75$ value was obtained, indicating that there was no statistically significant difference.

Figure 2 shows the evolution of the average pain intensity for AG over the eight weeks of treatment immediately before geotherapy (pre) and immediately after geotherapy (post).

According to figure 2, AG showed a reduction in pain intensity over the course of treatment, both before and after the application of green clay, indicating an improvement in pain. For the pre-application assessment, the reduction was 22.67% and for the post-application it was 61.43%. In the latter, it is possible to see a stable pain reduction rate from the fourth week of application, with the hypothesis that if the treatments were extended, the reduction could be greater.

In the AG group, five participants reported using pain drugs. They had an average reduction in pain intensity of 0.8 in the eight weeks prior to application, and an average reduction in pain intensity of 3.4 after the eighth application of geotherapy. When comparing these values with other participants in the AG who did not use any type of drug during the weeks of applica-

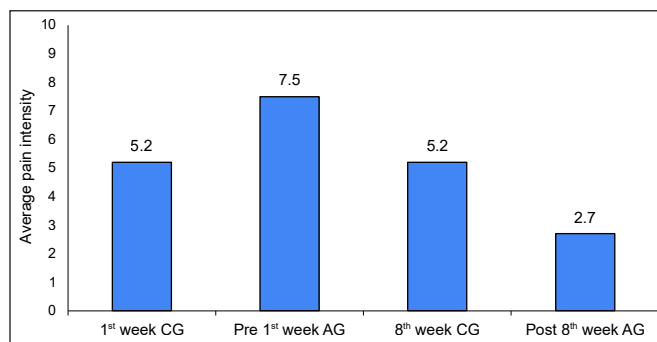


Figure 1. Average pain intensity of the control (CG) and application (AG) groups at the start of the study and after eight weeks.

Table 1. Body region and pain intensity reported by study participants

| Visual representation of the area of pain | Body regions | Location of pain (%) | Average initial pain intensity (0 to 10) | Average final pain intensity CG (0 to 10) | Average final pain intensity AG (0 a 10) |
|---|---------------------|----------------------|--|---|--|
| <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>Front</p> </div> <div style="text-align: center;"> <p>Back</p> </div> </div> | 1. Trapezius | 30% | 6.5 | 5.3 | 4.3 |
| | 2. Pectoralis major | 25% | 5.6 | 6 | 3 |
| | 3. Low back | 20% | 6 | 5.5 | 0 |
| | 4. Biceps | 20% | 6.5 | 10 | 3 |
| | 5. Calf | 10% | 5.5 | 2.5 | -* |
| | 6. Triceps | 10% | 8 | - | 2.5 |
| | 7. Biceps femoris | 5% | 7 | 7 | - |
| | 8. Forearm | 5% | 8 | 7 | - |
| | 9. Quadriceps | 5% | 6 | 7 | - |
| | 10. Hands | 5% | 7 | - | 2 |
| | 11. Adductor | 5% | 8 | - | 3 |
| | 12. Soleus muscle | 5% | 8 | - | 3 |

*No pain reported.

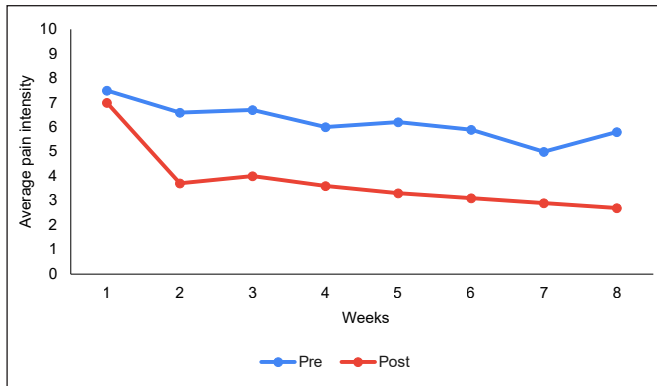


Figure 2. Evolution of the average pain intensity for the application group (GA) over the eight weeks before the application of geotherapy (pre) and after the application (post).

tion, the average pain intensity had a reduction of 2.6 in the eight weeks prior to application, and a reduction in the average pain intensity of 5.2 after the eighth application of geotherapy. In relation to the CG, four participants used drugs throughout the study period, with an increase of 0.15 in average pain intensity, while the other six participants who did not report using drugs had a reduction of 0.2 in average pain intensity after eight weeks.

In total, 11 participants reported using non-pharmacological methods for pain relief, 6 participants belonging to the CG and 5 participants belonging to the AG. The average pain intensity of the 6 CG participants increased by 0.8 by the eighth week, while the other CG members had a reduction in average pain of 1.25 by the eighth week. When the average pain of the 5 AG participants was analyzed, a reduction of 3 points pre-application and 5.4 points post-application was found. The average pain of the other AG participants was reduced by 0.4 pre-application and 4.2 post-application.

DISCUSSION

This study showed an improvement in pain in the AG, both in relation to the CG and in relation to the initial week. In addition, there was also an improvement in pain in relation to the pre-application, indicating immediate relief after application of the green clay. This result may be associated with the mineral properties found in the crystalline structures of green clay, which react with the tissues, favoring circulation, as well as its analgesic and anti-inflammatory effects, thus regulating body homeostasis⁶.

Nevertheless, it is challenging to measure and control the external factors of the study, since pain is a subjective experience that often fluctuates and has its effects placated by multiple factors². In both groups (CG and AG), there were participants who used drugs to combat pain and, in both cases, the average pain score according to the VAS of those who used drugs was higher. This indicates that the participants who experienced the most pain were using drugs as a palliative measure, since the average pain score did not vary much, in addition to the need to investigate and treat the cause of the pain and not just the symptom⁷.

In addition to the use of drugs, both groups also had participants who used non-pharmacological techniques for pain relief. In none of the groups was there a significant difference between the average pain of participants who used other techniques and those who didn't; possibly, the use of these techniques only contributed to a momentary relief⁸.

Analyzing the results by location (Table 1) indicated the sites with the greatest difference in average pain intensity between the eighth week of post-application CG and AG. The area with the greatest reduction was the biceps (7 points difference), followed by the lumbar (5.5 points), pectoralis major (3 points) and trapezius (1 point), the latter being the area most affected by the participants.

The data therefore indicates that the most benefited locations are in the muscle areas related to the biceps and lower back, regions that are greatly affected by the high repetition rate of padel movements. This indicates that the pain-relieving potential of green clay is indeed significant, especially when compared to other methods⁹. The other areas were only found in one of the groups, so there is no comparison to understand the benefits generated by the application of green clay.

Pain/injuries to the upper limbs can be associated with incorrect training techniques, lack of adequate physical condition, irregular training sessions and muscle weakening¹⁰. Injuries to the lower limbs, as well as the dorsal and lumbar regions, are directly associated with the regular practice of sport, because these are common areas of injury in padel tennis players¹¹.

It is important for the academic community to study non-pharmacological ways to help and combat pain, especially through the use of geotherapy, a simple, safe and non-invasive practice that has been shown to be effective in clinical studies, besides having therapeutic capacity in inflammatory processes, wounds, scars, injuries and musculoskeletal problems⁵.

CONCLUSION

The use of green clay for chronic muscle pain in paddle tennis players showed a statistically significant effect, promoting a reduction in the pain scale. As a result, the AG reduced the intensity of pain by 58.7% compared to the GC over the eight weeks of application. The AG also presented reduced intensity of pain by 64% compared to the pain before and after the application of geotherapy.

However, the sample of participants was significantly small, and the duration of the study does not to understand the possible side effects of using this technique in the long term. It was difficult to find articles relevant to the topic, clay is typically associated with the aesthetic area, and its use is rarely directed at pain, compromising a complete comprehension of the treatment mechanisms. In addition, the questionnaire applied did not require a description of the drugs used for pain relief.

In any case, the research is relevant to all professionals in the field of health, biological sciences, or who work in the recovery of chronic and acute muscle pain. Further studies on the subject are suggested, such as prospective and longitudinal studies, which provide results related to the case developed in this study. These

studies could verify possible future pain or even immediate improvement in the participants, as well as seeking to understand the extent of the analgesic properties of green clay.

AUTHORS' CONTRIBUTIONS

Julia Becker Lopes

Statistical analysis, Data Collection, Conceptualization, Resource Management, Project Management, Research, Methodology, Writing - Preparation of the original, Writing - Review and Editing, Visualization

Ana Beatriz Boing da Veiga

Statistical analysis, Data Collection, Conceptualization, Resource Management, Project Management, Research, Methodology, Writing - Preparation of the original, Writing - Review and Editing, Visualization

Raiza Cainá de Souza Fagundes

Conceptualization, Project Management, Supervision, Validation, Visualization

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