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RESEARCH ARTICLE

Effect of Aloe vera gel *versus* olive oil in the prevention of pressure ulcers among bedridden patients: A pilot study

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Abstract

Given the high occurrence of pressure ulcers in healthcare settings, this research sought to determine the efficacy of using Aloe vera gel or olive oil to prevent them in bedridden patients. Nurses often work long hours to avoid pressure ulcers, making it critical to investigate alternate remedies. Previous research revealed that Aloe vera gel and olive oil might accelerate pressure ulcer healing by lowering microbial presence and maintaining skin integrity, making them possible preventative strategies. The research included 30 volunteers who were randomly assigned to one of three groups: Aloe vera gel, olive oil, or regular skincare. Over an 11-day period, the efficacy of each therapy in avoiding pressure ulcers was measured using the european pressure ulcers advisory panel (EPUAP) and braden scales. Although direct comparison between the two treatment groups was restricted due to the small sample size, the Aloe vera gel and olive oil groups revealed a considerably decreased incidence of pressure ulcers compared to the control group. In conclusion, using olive oil and Aloe vera gel to the skin of bedridden patients showed promise in lowering the incidence of pressure ulcers. More study is needed to validate these results and make herbal treatments essential to preventative skincare practices for skin disorders in hospital settings.

Keywords: Pressure ulcers, Aloe vera gel, Olive oil, Bedridden patients, Herbal products, Complementary therapies.

Introduction

Patients who are bedridden present unique challenges to healthcare professionals, primarily due to the high prevalence of pressure ulcers, also known as bedsores or pressure sores. These ulcers can cause severe pain and various skin lesions when constant pressure is applied to specific areas of the body, leading to potential complications such as infections and delayed wound healing. Additionally, pressure ulcers result in a lower quality of life for patients and increased demands on healthcare resources due to extended hospital stays and high medical costs (Brem *et al.,* 2010).

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Pressure ulcers can develop when various forces, including friction, shear, and continuous pressure, act on the skin simultaneously. Bedridden or immobile individuals are at a higher risk of developing pressure ulcers as they are unable to change their body position independently. Pressure ulcers affect patients, healthcare providers, and facilities, leading to increased costs and resource strain (Brem *et al.,* 2010). Complications like cellulitis, osteomyelitis, and septic shock can further elevate risks for patients with pressure ulcers (Edsberg *et al.,* 2016).

Patients who cannot change their body positions should receive frequent posture modifications, use pressure-relieving products like cushions and mattresses, and maintain strict skincare routines. Assessment tools like the Braden Scale and the Norton Scale assist healthcare professionals in identifying individuals at the highest risk of developing pressure ulcers (Kottner *et al.,* 2019; Black *et al.,* 2007). Although these measures can reduce the risk, they cannot guarantee the complete absence of pressure ulcers. Therefore, preventing pressure ulcers is essential to alleviate patient suffering, improve quality of life, and reduce healthcare expenses. Therefore, it is important to find effective prevention methods that can minimize suffering and reduce healthcare costs (Brem *et al.,* 2010). Given these concerns, it is essential to explore alternative, cost-effective,

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and readily available therapies to minimize the occurrence of pressure ulcers. Experiments have been conducted to investigate methods for preventing pressure sores, leading to the exploration of natural treatments. Recent studies have revealed the potential effect of treatments such as Aloe vera gel and olive oil.

Aloe vera, a succulent plant known for its medicinal properties, has been used for centuries to treat various ailments (Dat *et al.,* 2012). On the other hand, olive oil is a staple food in the Mediterranean diet and has been the focus of scientific investigation into the possible health advantages it provides in wound healing and the maintenance of good skin. Its widespread recognition may be attributed to its very high nutritional density (Daz-Valenzuela *et al*., 2019). Olive oil and aloe vera gel are both promising candidates for treating and preventing pressure ulcers since they are readily available, affordable, and have low risk of side effects.

While olive oil and aloe vera gel have traditionally been used to heal wounds, some evidence suggests that olive oil may be the more effective treatment. Aloe vera is believed to possess anti-inflammatory, antioxidant, and wound-healing properties due to its high concentration of bioactive components, including polysaccharides, vitamins, and minerals (Dat *et al.,* 2012). Olive oil has a range of useful components, some of which have been shown to aid in skin cell regeneration and moisture retention. These components include essential fatty acids, phytosterols, and squalene. Olive oil is not only a source of squalene but also an integral part of the molecule that makes up squalene itself (Daz*et al.,* 2019). While both show promise, olive oil has demonstrated particular effectiveness, especially in treating diabetic foot ulcers. However, a lack of comprehensive research directly compares the effectiveness of these two natural treatments in a controlled clinical trial setting.

This study explores the potential of olive oil and aloe vera gel as treatments and preventive measures for pressure ulcers, taking into account the specific benefits each substance offers. This study aims to compare the efficacy of using olive oil or aloe vera gel as a preventative measure against the formation of pressure ulcers in bedridden patients. Specifically, the focus was on determining whether the method is more beneficial.

Material and Methods

A quasi-experimental approach was used in this exploratory study to evaluate the efficacy of olive oil and aloe vera gel in treating pressure ulcers in orthopedic patients. A total of 30 people in all, all of whom were at least 18 years old and admitted to orthopedic wards, were included in the study. Participants had to be willing to participate in the trial, have a Braden pressure ulcer score between 9 and 14, have no known allergies to aloe vera gel or olive oil, and have spent less than 48 hours in the hospital to be eligible. Participation is required to fulfill these criteria. The Government Medical College and Hospital in Jammu's administrative committee gave their approval to the research idea. Patients with moderate to high-risk Braden pressure ulcer scores received extra attention and care. All bedridden patients admitted to the specified ward made up the sample. There were three groups available for participants to choose from: An olive oil treatment group, an aloe vera treatment group, or a control group. Each group had ten individuals. Nine patients were randomly allocated to one of the three groups on the first day of data collection in June 2022 to ensure accuracy. Participants received a detailed explanation of the study's goals before any treatment was given, and they gave their informed consent. Each participant had a wealth of data gathered on them, including their demographics, clinical traits, pre-test Braden risk level, modified EPUAP risk score, and more.

Participants in the experimental groups applied 5 to 8 mL of ISSO-certified commercially produced aloe vera gel to bony prominences twice daily (at 8:00 a.m. and 8:00 p.m.) during the ten-day study period. Throughout the course of the experiment, this routine was followed, and the gel was applied daily at the same time. The NPUAP's pressure ulcer care package was followed by the control group (group 1), who received normal care. Similar procedures were followed for group 2, but they also applied 5 to 8 mL of virgin olive oil that was ISSO-certified topically to the troubled area. On the eleventh day of the trial, a thorough evaluation was done to determine the risk that individuals would experience pressure sores in the future. On the trial's last day, this evaluation took place. Throughout the duration of the trial, the control group received typical nursing care in accordance with NPUAP recommendations. Ten days of careful supervision were provided, and on the eleventh day, the results of the treatment were evaluated using the modified EPUAP scale and the Braden pressure ulcer risk assessment scale. The chance that participants would experience pressure ulcers was evaluated based on whether or not these signs were present. In order to meet the study's goals, 9–10 additional patients were consistently added to each of the three study groups, resulting in a continuous cycle that lasted an average of 11 days. A total of 30 volunteers for the study were obtained as a result of this comprehensive sampling technique over the period of one month, namely in June and July 2022.

Statistical Analysis

The data were analyzed statistically, including significance testing and mean value computation when the $p\text{-value} > 0.05$, which served as a threshold for identifying differences and considered statistically significant differences.

Results

The information discussed in the parts that came before it is elaborated upon and reviewed in the following tables. These tables provide a synopsis of the discoveries that were discovered *via* the study. To get things rolling, let's discuss the participants in the research as well as the demographics of the persons who were included in the sample. The participants' average age was 48.8 ± 14.16 years when they were assigned to the olive oil group, 43.4 ± 12.42 years when assigned to the aloe vera group, and 47 ± 13.02 years when assigned to the control group. The percentage of female participants among those who took part in the study was higher in the group that was subjected to the experiment, which included 30% of the total, compared to the control group, which comprised 70% of the total and did not include any women. In 80% of men and 20% of women received treatment in the group that received therapy with aloe vera + olive oil, while in the group that received therapy with olive oil alone, 90% of men and 10% of women received treatment.

In addition, the Braden ratings were investigated and contrasted with one another across the board, taking into consideration each of the several domains. Figure 1 demonstrates that the control group had a Braden score of 11.8 ± 1.61. On the other hand, the scores for the groups that wer given olive oil and aloe vera as treatments were 11.7 ± 2.45 and 12.4 ± 1.42, respectively.

Another variable that was looked at was the average change from the pre-test to the post-test on the Braden pressure ulcer risk scale. This change was measured before and after the test. Individuals who got aloe vera gel had a risk of pressure ulcers that was 11.70 points lower than those who received olive oil, who had scores of 12.40, and those in the control group, who had scores of 11.80. This compared to people who received olive oil and people who were in the aloe vera gel group. After examining the statistical data, the findings revealed that the control and experimental groups did not vary from one another in a manner that could be considered statistically significant. The post-test scores for the risk of developing a pressure ulcer were 15.00 in the group that was given aloe vera gel, 14.60 in the group that was given olive oil, and 12.40 in the group that got neither therapy. In contrast, the scores in the group that received neither treatment were 12.40. Olive oil was a treatment option for each of these divisions in their totality during the whole process. When the data were analyzed using statistical techniques, it was discovered that the experimental group and the control group had a number of significant differences from one another. Table 1 presents the results of a one-way analysis of variance F test. These results may be seen here. This test's results were used to draw inferences on the statistical significance of the data. There was also no difference in risk score between the groups that were given olive oil or aloe vera gel, as shown by the findings of a post hoc multiple comparison that was performed using the Bonferroni t-test. In this specific study, there was a difference that could be regarded as statistically significant between the control group, the olive oil group, and the aloe vera gel group.

The difference in modified EPUAP risk between the control and experimental groups was also evaluated as part of this research. The European Pressure Ulcer Advisory Panel's (EPUAP) recommendations were used as the basis for creating the modified EPUAP risk level. On a scale measuring symptoms, patients who took aloe vera gel had an average score of 1.50, whereas patients in the control group had an average score of 7.10 on the scale. With a difference in value of 5.60, this suggests that there is a significant gap between the two collections. There was a significant difference of 4.60 points between the two groups, as shown by the symptom score of 2.50 in the olive oil group and 7.10 in the control group. As can be shown in Table 2, the differences that can be seen between the two groups are not only apparent but also remarkable. Both of these qualities were shown in the same manner in this instance.

It was shown that the incidence rate of pressure ulcers in the control group was 50%, with 30% of cases categorized as grade 1 and 20% as grade 2. On the other hand, the incidence rate was 20% in the group treated with aloe vera (Table 3), with 10% of the cases being classified as

Table 1: Multiple comparisons of pre-test and post-test mean Braden pressure ulcer risk score between experimental and control groups using Bonferroni T-Test

Domains	*Assessment*	*Experimental group*		*ANOVA test score*		*Bonferroni t-test*		
		Mean	*SD*	*F value*	*p-value*	*Comparison*	*MD*	*p-value*
	Aloe vera gel	11.70	1.70			Aloe *vs*. Olive	0.70	0.33
Pre-test	Olive oil	12.40	1.43	F = 0.57	p = 0.58	Aloe *vs*. control	0.10	0.89
	Control	11.80	1.62			Olive *vs*. control	0.60	0.41
	Aloe vera gel	15.00	1.76			Aloe *vs*. Olive	0.40	0.61
Posttest	Olive oil	14.60	1.78	F = 6.72	*p* = 0.001***	Aloe *vs*. control	2.60	0.01
	Control	12.40	1.58			Olive *vs*. control	2.20	0.01

wMD = mean difference *** p<0.001 very high significant

Table 2: Comparison of modified EPUAP risk level between the experimental groups and control group.

Pressure ulcer risk level as per modified EPUAP	Aloe vera *gel*		*Control*		*Mean difference*	*Mann Whitney U-test*
	Mean	*SD*	*Mean*	*SD*		
Post-test	1.50	1.58	7.10	7.37	5.60	Z = 2.09 p = 0.04*(S)
	Olive Oil		Control			
Post-test	2.50	4.74	7.10	7.37	4.60	Z = 1.98* p = 0.05(S)

Table 3: Incidence of pressure ulcer and grade

		Group (n = 30)					
		Aloe vera *gel*		*Olive oil*		*Control*	
		n	%	*n*	%	*n*	%
Incidence (yes/no)	Yes	2	20.00	1	10.00	5	50.00
	No	8	80.00	9	90.00	5	50.00
If yes (grades)	No	8	80.00	9	90.00	5	50.00
	GRADE 1	1	10.00	0	0.00	3	30.00
	GRADE 2	1	10.00	1	10.00	2	20.00
If yes wound location	no	8	80.00	9	90.00	5	50.00
	Sacrum	0	0.00	0	0.00	2	20.00
	Sacrum & Iliac	0	0.00	0	0.00	1	10.00
	Iliac	2	20.00	1	10.00	0	0.00
	Buttocks	0	0.00	0	0.00	2	20.00

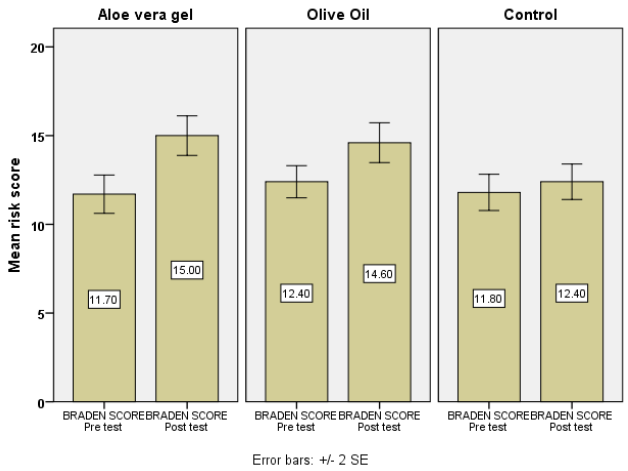
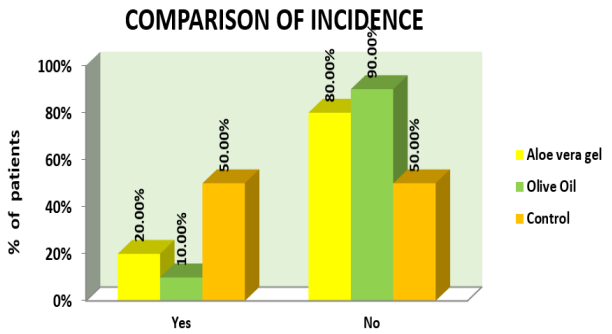


Figure 1: Simple bar with 2 standard error bar diagram compares the risk score between aloe vera gel, olive oil and control group

grade 1 and 10% being identified as grade 2, respectively. Figure 2 illustrates that towards the conclusion of the research project, those who were treated with olive oil had a significantly reduced risk of developing grade 1 pressure ulcers. This was the inference that could be made from the data that was gathered. Additionally, it was found that



Source: Author's Research

Figure 2: Incidence of pressure ulcers among experimental and control groups

pressure ulcers were prevalent, especially in the iliac crest area of the majority of patients. In addition, during the seventh and ninth days of their hospital stay, most patients in all treatment groups had a considerably elevated chance of getting pressure ulcers. This view suggests that the seventh and ninth day posed the greatest potential for danger.

Discussion

This study investigated the efficacy of two different herbal treatments for the prevention of pressure ulcers in hospitalized patients who are unable to move due to health conditions and have been admitted to the orthopedics ward. When compared to the group that acted as the control, the study's outcomes made it evident that the group that was treated with olive oil and aloe vera gel had a considerably lower chance of getting pressure ulcers. On the 11th day after treatment, the findings of the Braden pressure ulcer risk assessment scale and the modified EPUAP scale indicated statistically significant differences between the groups receiving aloe vera gel and those receiving a control. The EPUAP developed both scales. In order to provide a grade to the pressure ulcers, both of these factors were taken into consideration and applied. Olive oil consumption has been proven in previous research to have the potential to hasten the healing process of pressure ulcers. The results of the present study concur with the findings of the research that has been covered in previous discussions. According to the findings of the previous research study conducted by Rafeiei, after seven days, the average area of pressure ulcers was significantly decreased in the group that received olive oil as opposed to the group that received a placebo. This difference was able to be shown in both sets of data (Rafiei, 2020). Similar findings were obtained from the present study, with the olive oil group (10%) having a lower incidence of pressure ulcers than both the aloe vera group (20%) and the control group (50%), respectively.

Because it has a high concentration of therapeutic components such as essential fatty acids, phytosterols, and squalene, olive oil is one of the oils used for treating skin

diseases more often than any other oil. Both oleic and linoleic acid, which are categories of fatty acid, play an important part in this process as well. Olive oil has been proven to have a therapeutic safety profile that is equivalent to other therapies rich in oxygenated fatty acids when applied topically, according to previous studies (Daz-Valenzuela *et al.,*2019).

According to our results, the fatty acids found in extra virgin olive oil have a key role in improving the skin's ability to retain moisture, strengthening the skin's suppleness and resilience. In addition, this function contributes to the production of new skin cells located on the skin's surface. Olive oil effectively prevents skin breakdown, making it a beneficial protection for skin regions subjected to prolonged friction or pressure. This protection is especially helpful for portions of the skin exposed to harsh conditions for an extended period. Olive oil may also be beneficial for people who are unable to move around on their own, including those who are bedridden or confined to wheelchairs (Hawaibam *et al.,*2016). Aloe vera gel powder was used in another study conducted by Matsuo *et al.* to discover whether or not it is capable of mending bedsores. In order to create the powdered gel, the aloe vera gel was subjected to a one-of-a-kind freeze-drying procedure that additionally included irradiations from microwaves and far infrared radiation. Because of this, a powdered version of the gel was produced. After applying the macromolecule aloe vera ointment, the data revealed that persons suffering from ulcers of the first or second degree had a high chance of achieving a complete recovery (Matsuo *et al.,* 2009).

In a similar study, researchers evaluated the effectiveness of gels comprising starch and water to the efficacy of aloe vera gel for the prevention of pressure ulcers. Aloe vera gel was shown to be more effective. Using a gel that was made from aloe vera may help minimize the chance of developing stage one pressure ulcers, as shown by the findings of the study conducted by Hekmatpou *et al.* The fact that the gel could be created as a result of this demonstrated this point. The patients each had gel administered to their hips, sacrum, and heels as part of the therapy. The gel might have been made of aloe vera, starch, or water. These gels were given out to the participants as part of the intervention. A randomization procedure was used to choose out these gels. During the whole of the study endeavor, every feasible safety measure was taken to prevent unexpected changes in temperature. This is because sudden temperature shifts are one of the most important contributing variables that might result in the development of pressure ulcers. On day 10, it was seen that a lower number of patients who had been administered aloe vera gel had developed pressure ulcers. This was the case for those patients who had received the gel. This was seen in the patients who had been treated with the medication in question (Hekmatpou *et al.,* 2018).

It has been known for quite some time that the plant aloe vera, which is shaped like a cactus, may have the capacity to speed the delicate biological process of wound healing, which is required for the regeneration of injured tissue. A number of studies has supported this possibility. In 1998, when this talent was discovered. Researchers made this discovery just around the turn of the century. During the course of a number of different research studies, it was discovered that this approach was advantageous for a diverse variety of animal species. The historical uses of aloe vera have been handed down from one generation to the next, and the vast usage of the plant in today's culture is mostly a continuation of its widespread use in the past. The accumulation of scientific data to suggest its curative capabilities would be of enormous help to practitioners of medical care. This would be the case since it can potentially improve patient compliance with wound healing therapies and reduce the costs associated with obtaining such treatments (Dat *et al.,* 2012).

In addition, Fallahi *et al.*, in 2022, conducted a study to explore the effectiveness of aloe vera gel and olive oil in the prevention of pressure ulcers in the intensive care unit (ICU), both on their own and in combination with one another. The study was carried out in both of these ways: Individually and in combination with one another. The researchers compared the outcomes of their investigation to the results obtained by a control group that was given a placebo. They compared their results to those obtained from a control group that did not participate in either of the treatments being investigated. When the researchers were collecting the essential data for the study, they used the Braden scale and the scale that the National Pressure Ulcer Advisory Panel developed. Both of these scales were used in conjunction with one another. During the duration of the intervention, which lasted for a period of thirty days, the control group was provided with the standard medical care that was expected of them, while the intervention groups were either given olive oil, aloe vera gel, or a combination of the two. The control group also received the standard medical treatment that was expected of them. The individuals in the control group were provided with the standard medical care that was anticipated of them. The intervention was carried out over the course of a period of one calendar month. The individuals who were part of the control group got the standard quantity of ongoing medical therapy that is typical for persons in their condition. This treatment was provided to them by the researchers. It was suggested that the specific gel or oil be applied to the body parts at a high risk of developing pressure ulcers. This was done in accordance with the recommendation (Fallahi *et al.,* 2022).

The purpose of doing this was to ensure that the therapy was as successful as possible. Before the administration of the treatment, not a single one of the groups that were being

examined had any signs that they had ever been affected by pressure ulcers. This was because there was no evidence that any of the groups had ever been subjected to the condition. This was the situation despite the fact that they had all been exposed to the same circumstances. On the other hand, by the time the intervention was over, 12 patients in the olive oil group had developed pressure ulcers, 20 patients in the aloe vera gel group had acquired pressure ulcers, 10 patients in the combination group had developed pressure ulcers, and 22 patients in the control group had developed pressure ulcers. According to the data collected, only 10% of patients had ulcers in the second stage, but in the first stage, forty percent suffered pressure ulcers (Fallahi *et al.,* 2022).

According to the findings, the use of olive oil as a topical treatment, that is, applying olive oil directly to the pressure areas might have the potential to lessen the number of bedridden people who end up developing pressure ulcers. It is essential that this difference be made in light of the fact that the topical application of aloe vera gel was also used in the course of this investigation.

Recommendation and Limitations

Although the pilot study suggested that olive oil and aloe vera may help prevent pressure ulcers, care must be taken when implementing these results in terms of dosage and frequency. Depending on the specifics of each case, the amount and frequency of olive oil and aloe vera administration may need to be adjusted. Because data were only gathered from one site, it may have been harder to generalize the study's findings. Due to the study's single-site focus, the participant pool was constrained, which led to this drawback. As a result, significant caution must be used when applying these findings to a wider variety of healthcare settings or bigger patient groups in order to prevent unanticipated results. In order to increase the study's external validity and provide a more thorough understanding of the effectiveness of olive oil and aloe vera in varied circumstances, additional research with bigger and demographically diverse samples is required.

A deeper understanding of the efficiency of olive oil and aloe vera in various situations also calls for better investigation. It might be necessary to carry out additional research with samples representing a larger variety of features to reach this goal. More investigation may be required to gain a thorough grasp of the efficacy of these natural therapies.

Aloe vera and olive oil, particularly for immobile patients, show promise in reducing pressure ulcers, but it is important to consider this pilot trial's limitations. When incorporating these findings into clinical practice, healthcare professionals should exercise caution and take into account individualized treatment strategies. Additional research with larger and more varied samples is necessary to strengthen the evidence basis.

Conclusion

In conclusion, the findings of this research project light on the benefits of natural remedies, such as gel derived from aloe vera and olive oil, in the prevention of pressure ulcers among bedridden patients in orthopedic wards. Olive oil and aloe vera gel have both been shown to be useful in lowering the incidence of patients developing pressure ulcer. This is especially true when compared to the group that served as the control in the research. It has been shown that olive oil, which is abundant in essential fatty acids as well as other substances that are helpful, has a key part in the process of skin regeneration and in the maintenance of the skin's ability to retain moisture. As a consequence, olive oil has shown potential as a remedy for avoiding pressure ulcers. Olive oil has a wealth of additional beneficial compounds in abundance. In addition, aloe vera gel was shown to be useful, especially in the early stages of ulcers; this substantiates the traditional function of aloe vera in the process of wound healing. In addition, the combination of olive oil and aloe vera gel showed exceptional results, illustrating the possibility of synergy between the two substances. However, further research and clinical studies are required so that their application may be enhanced and so that their effects can be examined over a longer length of time. These results are a contribution to the expanding body of research that supports the use of natural remedies as options in the management of pressure ulcers. This has the potential to improve both the treatment provided to patients and the quality of life of individuals afflicted with the ailment.

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