Efficacy of Hot Fomentation with Epsom Salt on Reduction of Knee Pain and Inability Among Geriatrics with Osteoarthritis

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Epsom Salt, Geriatrics , Osteoarthritis, Fomentation.

ABSTRACT
Quasi-experimental pretest posttest control group research design was adopted to investigate the efficacy of hot fomentation with Epsom salt on reduction of knee pain and inability among 60 geriatrics with osteoarthritis in the Geriatric Clinic at Urban Primary Health Centre (UPHC), Madhuravoyal. The pretest inability and pain level was assessed using WOMAC Osteoarthritis Index , followed by that, hot fomentation with Epsom salt was applied over knee joint for the duration of 20 minutes twice a day for a period of 2 weeks and the posttest was reassessed using same WOMAC Osteoarthritis Index . The pretest and posttest mean score of knee joint pain in the interventional group was 76.07±6.89 ,41.70±11.94 with mean difference 34.37. The calculated paired 't' test value of t = 13.788 was found to be statistically significant at p<0.001 level which clearly infers that there was reduction in the level of knee joint pain after the administration of Hot fomentation with Epsom Salt among geriatrics with osteoarthritis in the interventional group. The pretest and posttest mean score of knee joint pain in the placebo group was 75.07±7.68 75.03±6.99 with mean difference score 0.04. The calculated paired 't' test value of t = 0.103 was not found to be statistically significant which clearly infers that there was no significant reduction in the level of knee joint pain in the placebo group. The calculated students independent 't' test value of t = 0.103 in the pretest between the interventional and placebo group was not found to be statistically significant. The calculated students independent 't' test value of t = 13.189 with mean difference score of 33.33 in the post test between the interventional and placebo group was found to be statistically significant at p<0.001 level. This clearly infers that Hot fomentation with Epsom Salt administered among the geriatrics with osteoarthritis in the interventional group was found to be effective in reduction in the knee joint pain than the elderly people with osteoarthritis.

1. Introduction

Globally, osteoarthritis (OA) is tremendously recognized as a chronic joint disease resulting in pain, impairment and functional loss [1]. Osteoarthritis (OA) is a disease characterized by several anatomical and physiological changes of joint tissues, such as osteophyte production, bone remodeling, and cartilage degradation [2]. Between 1990 and 2019, the average number of years lived with a limitation as a result of OA raised by 114.5% nationwide [1]. The overall prevalence of OA in the Kanchipuram districts of rural communities was 27.1%. Women constitutes about 29.8% and men 22.3% [2]. OA is the most prevalent cause of Several years Living with Disability (YLD), ranking fourth in the Global Burden of Disease report from 2000.[3]A study determined that the eventual chance of developing knee OA was 40% for men and 47% for women, with obesity contributing with greater risks.[4] The risk factors for osteoarthritis (OA) can be divided into two groups: joint-level factors including injury, incorrect positioning, inappropriate joint loading and person-level factors including age, genders, obesity, and genetic makeup [5]. Pain, stiffness, swelling, and restrictions in joint function constitute a few of the clinical indications of Osteoarthritis (OA) [6]. The incapability of chondrocytes to sustain the equilibrium between the production or breakdown of these extracellular matrix constituents leads to osteoarthritis [7]. Based with our present understanding of the physiology of osteoarthritis (OA), a variety of factors, including genetic, age-dependent, metabolic, endocrinologic, and other risk factors, might throw off the

joint's equilibrium. The tissues surrounding the joint area produce different chemicals as a result of this disruption, which may have tissue-damaging, catabolic, or inflammatory effects [8].Osteoarthritis (OA) is the most widespread joint condition seen in clinical practice and the second most prevalent rheumatological issue. In older adults, this is the most typical root cause of locomotor impairment [9]. A complex relation between the severity of the disease, pain, comorbid illness, psychological factors and physical capacity impairments such reduced aerobic activity level and weakness in the lower extremities leads to physical disability from knee OA [10]. According to a Japanese population-based study, people with severe knee OA had substantially poorer physical health [11].

The interventions to reduce knee pain among clients suffering with osteoarthritis includes both pharmacological and non-pharmacological interventions. The pharmacological treatment includes oral and topical Non-Steroidal Anti-inflammatory Drugs (NSAIDs), intra-articular corticosteroid injection [12]. The physical therapy modalities include diathermy, exercise, ultrasound therapy, knee brace, electrical stimulation etc [13]. Surgical treatment includes joint lavage, total joint replacement. Other alternative treatment include acupuncture, heat and cold pad, orthosis [14].

Epsom salt is a natural, tried-and-true mineral composition that can be used for a variety of purposes, such as reducing pain and achy muscles or building at-home spas [15]. Epsom salt is a magnesium sulfate mineral that reduces discomfort. Toxins are drawn out while applying as a compress, which promotes healing. Its high sulfate and magnesium content, affordability, accessibility, and health benefits make it beneficial for elderly people with knee discomfort [16]. Epsom salt is an effective painkiller with no adverse effects because of its analgesic and anti-inflammatory qualities. It functions as Alternative and complementary therapy, exceeding steroidal and hormonal treatments. It's an accessible at-home therapy for those with arthritis that's affordable and easily available.[17]

It has been identified by the investigators that many geriatrics are suffering with severe knee pain and disability due to osteoarthritis when working as a student nurse during her clinical experience and only very limited research studies were conducted on hot fomentation with Epsom salt on reducing the knee pain and for improving the inability level while gathering the literatures, which made the investigator's to take the present study as mustard plaster application is found to play a useful role improving the disability level and reducing the pain, as Epsom salt has the pain relieving properties and enhances blood circulation., by its anti - inflammatory properties it also reduces pain perception in the affected area.

Therefore, the objectives of current study were:

1. To assess the pretest levels of pain and inability among geriatrics with osteoarthritis in both interventional and placebo groups.

2. To determine the effectiveness of hot fomentation with Epsom salt on reduction in level of pain and inability among geriatrics with osteoarthritis in the interventional group.

3. To assess the posttest levels of pain and inability among geriatrics with osteoarthritis in both interventional and placebo groups.

4. To find out the association between posttest levels of pain and inability among geriatrics with osteoarthritis with their selected demographic variables.

2. Material and Methods

Study Design: Quasi-experimental pretest posttest control group research design was adopted to investigate the efficacy of hot fomentation with Epsom salt on reduction of knee pain and inability among geriatrics with osteoarthritis. Study Setting: The current study was conducted for the duration of 3months from June 2024 till September 2024 in the Geriatric Clinic at Urban Primary Health Centre (UPHC), Madhuravoyal. Ethical Approval: After obtaining the ethical clearance from the Institutional Human Ethics Committee (IHEC) of Saveetha Institute of Medical and Technical Sciences and a formal permission from the departmental head of General Medicine, the study was conducted. Study Participants: A total of 60 geriatrics who fulfils and meets the inclusion criteria were recruited as study participants. The inability was assessed by using Womac index which includes 24 parameters under three major headings as joint pain, joint stiffness and difficulty in performing the daily activities. For each questions, there are 5 responses with scoring from 0-4; the total score

is 96. Based on total scoring, grading was categorized as mild (1-24) moderate (25-48) severe (49-74) and extreme (75-96) and the severity of pain level was assessed using numerical pain rating scale. The individuals who are diagnosed as osteoarthritis aged above 65 years, who have extreme and severe knee joint pain when assessed using WOMAC Osteoarthritis Index (Western Ontario Mc Master University Osteoarthritis Index), who are willing to participate, can read and speak Tamil or English, were included in the current study. The individuals who have mild knee joint pain when assessed using WOMAC Osteoarthritis Index (Western Ontario Mc Master University Osteoarthritis Index), who under treatment for osteoarthritis, who are allergic to Epsom salt, with severe co-morbidities, burns, skin lesions, on the joints, psychiatric disturbances, under treatment with alternative therapies, severe neuropathies, non-co-operative, were excluded. Sampling Technique: The participants were recruited through non probability purposive sampling technique. All the 60 study participants were allotted to the interventional group (Hot fomentation with Epsom salt). Informed Consent: The purpose of study was explained clearly in-depth to each of the study participant and a written informed consent was obtained from them. Pre-Assessment: The demographic and clinical information was gathered by using a self-structured questionnaire, followed by that, the inability was assessed by using Womac index which includes 24 parameters under three major headings as joint pain, joint stiffness and difficulty in performing the daily activities and the severity of pain level was assessed using numerical pain rating scale. On Day-1, demographic and clinical data were collected from the study participants, followed by that, application of hot fomentation with Epsom salt was applied over knee joint for the duration of 20 minutes twice a day for a period of 2 weeks. Preparation of Epsom salt for Hot Fomentation: 30 grams of Epsom salt with 1 litre of water (water temperature 30-40 °C). Hot fomentation was created by immersing a clean cloth in the boiled water. After squeezing out the excess water from the cloth, it was applied over the knee joint Post-Assessment: On Day-15, study participants were re-assessed by using WOMAC Osteoarthritis Index in the interventional group.

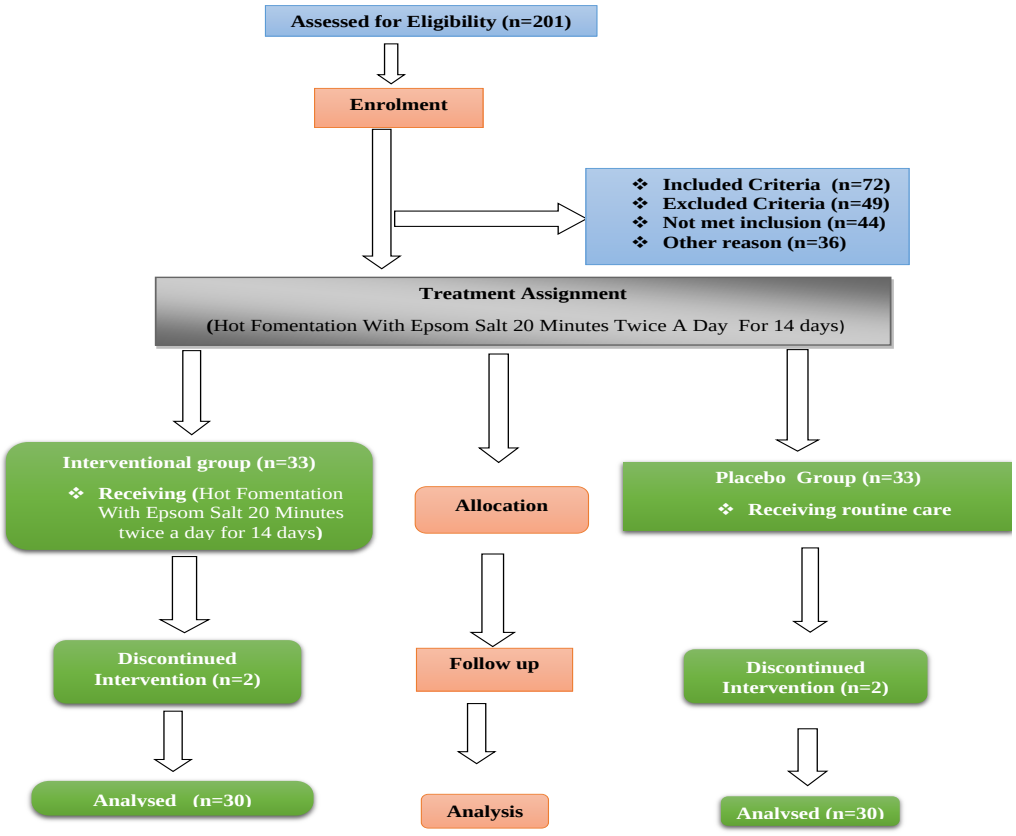

Figure :1 Consort Flowchart for The Patient's Recruitment Process

3. Results and Discussion

Demographic Characteristics

In the interventional group majority of geriatrics, 23(76%) were aged above 60 years, 15(50%) were male and female, 10(33.3%) had primary education and were unemployed, 9(30%) had monthly income of Rs. 15,000 – 20,000, 17(56.7%) were following mixed diet pattern, 20(66.7%) belonged to nuclear family, 16(53.3%) were residing in urban area, 15(50%) were married, 17(56.7%) had non-consanguineous marriage and 11(36.7%) had slept for 5 – 6 hrs/day. Whereas in the placebo group majority of geriatrics,14(46.7%) were aged 60 years, 18(60%) were male and female, 13(43.3%) had primary education, 10(33.3%) were unemployed, 9(30%) had monthly income of Rs.5000 & Rs. 10,000 – 15,000, 21(70%) were following mixed diet pattern, 24(80%) belonged to nuclear family, 13(43.3%) were residing in urban area, 24(80%) were married, 16(53.3%) had non-consanguineous marriage and 11(36.7%) had slept for 5 – 6 hrs/day. In the interventional group majority of geriatrics, 14(46.7%) were in the height range of 150 – 165 cm, 17(56.7%) were weighing between 50 – 55 kg, 26(86.7%) had BMI below 18 kgm^{-2}, 17(56.7%) had knee pain for 3 months, 30(100%) had not taken previous treatment for knee pain and had no previous history fracture in legs, whereas in the placebo group majority of geriatrics 14(46.7%) were in the height range of 145 – 150 cm and 150 – 165 cm, 15(50%) were weighing between 50 – 55 kg, 28(93.3%) had BMI below 18 kgm^{-2}, 17(56.7%) had knee pain for 3 months, 30(100%) had not taken previous treatment for knee pain and had no previous history fracture in legs.

Assessment On Level Of Knee Joint Pain And Physical Inability Among Elderly People With Osteoarthritis.

In the pretest of interventional group, 24(80%) had extreme knee joint pain and 6(20%) had severe knee joint pain and after the intervention, 14(46.7%) had severe knee joint pain, 13(43.3%) had moderate knee joint pain and 3(10%) had mild knee joint pain whereas in the pretest of placebo group 23(76.7%) had extreme knee joint pain and 7(23.3%) had severe knee joint pain and in the post test, 22(73.3%) had extreme knee joint pain and 8(26.7%) had severe knee joint pain. (as depicted in Table:1 and Figure:2)

Table 1: Frequency And Percentage Distribution Of Pretest And Post Test Level Of Knee Joint Pain And Physical Inability Among Geriatrics With Osteoarthritis With In The Interventional And Placebo Group.

N = 60(30+30)

Level of Knee Joint Pain and physical inability	Interventional Group				Placebo Group			
	Pretest		Post Test		Pretest		Post Test	
	No.	%	No.	%	No.	%	No.	%
Mild (1 – 24)	-	-	3	10.0	-	-	-	-
Moderate (25 – 48)	-	-	13	43.3	-	-	-	-
Severe (49 – 72)	6	20.0	14	46.7	7	23.3	8	26.7
Extreme (73 – 96)	24	80.0	0	0	23	76.7	22	73.3

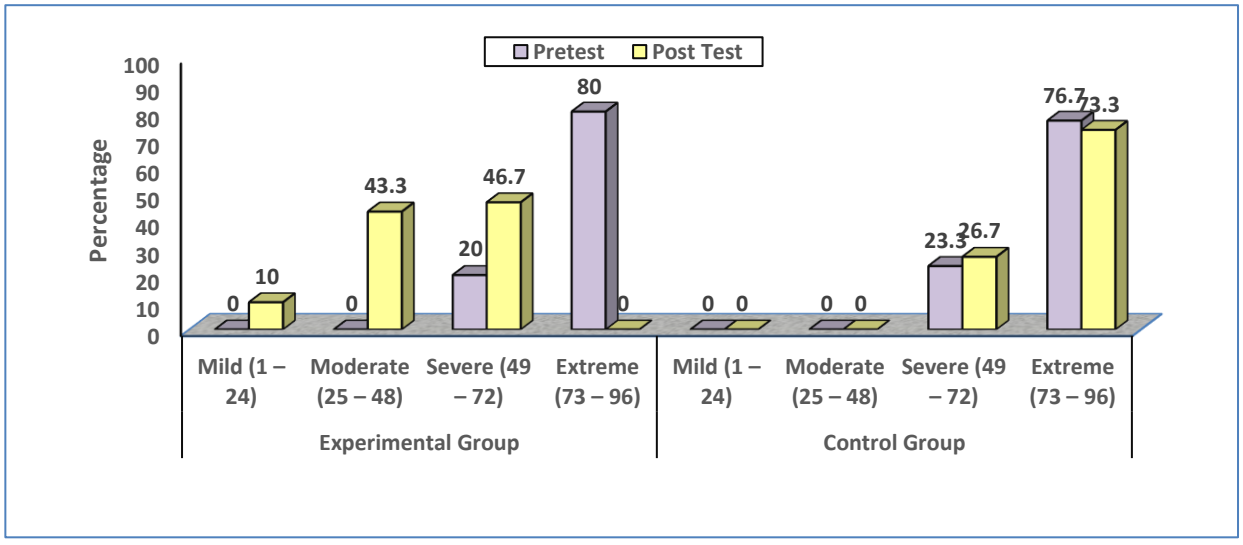

Figure:2 Percentage Distribution Of Pretest And Post Test Level Of Knee Joint Pain And Physical Inability Among Geriatrics With Osteoarthritis With In The Interventional And Placebo Group

A common symptom of painful knees is a decline in physical performance, which is an accurate warning sign of future impairment. Researchers have identified and reported that patients with osteoarthritis had a variety of physical conditions that restricted their ability to use their lower limbs [18]. The age is considered as a major risk for developing arthritis among individuals [19]. In the current study, majority of our study participants 23 (76%) were aged above 60 years which has given the evidence that age plays a major role in developing arthritis among geriatrics. A cross sectional study was conducted among 480 individuals diagnosed with osteoarthritis aiming in evaluating the prevalence of knee pain and the outcome of study results concluded that, the intensity of knee pain majority of 77.8% of study participant's experienced pain, 12.4% illustrated continuous pain and 6.5% exhibited worst pain. When analyzed the physical functioning of these participants about 48% of participants were able to perform light activities and 11% were unable to perform any activity[20] .It has been evident and proven from the above studies and the present investigation depicted that, the pretest level of knee joint pain and physical inability of our current study participant's, the clients with osteoarthritis will experience intense pain knee joint and restricted physical abilities. In the present study, the investigator's failed to identify the exact etiology for occurrence of joint pain and limitations on their physical ability.

Effectiveness Of Hot Fomentation With Epsom Salt On Reducing Knee Joint Pain And Physical Inability Among Geriatrics With Osteoarthritis

The pretest mean score of knee joint pain among geriatrics with osteoarthritis in the interventional group was 76.07±6.89 and the posttest mean score was 41.70±11.94. The mean difference score was 34.37. The calculated paired 't' test value of t = 13.788 was found to be statistically significant at p<0.001 level which clearly infers that there was reduction in the level of knee joint pain after the administration of Hot fomentation with Epsom Salt among geriatrics with osteoarthritis in the interventional group. The pretest mean score of knee joint pain among geriatrics with osteoarthritis in the placebo group was 75.07±7.68 and the posttest mean score was 75.03±6.99. The mean difference score was 0.04. The calculated paired 't' test value of t = 0.103 was not found to be statistically significant which clearly infers that there was no significant reduction in the level of knee joint pain among geriatrics with osteoarthritis in the placebo group. The calculated students independent 't' test value of t = 0.103 in the pretest between the interventional and placebo group was not found to be statistically significant. The calculated students independent 't' test value of t = 13.189 with mean difference score of 33.33 in the post test between the interventional and placebo group was found to be statistically significant at p<0.001 level. This clearly infers that Hot fomentation with Epsom Salt administered among the geriatrics with osteoarthritis in the interventional group was found to be effective in reduction in the knee joint pain than the elderly people with osteoarthritis in the control group who had undergone hospital routine measures. (as outlined in Table:2 and Figure:3)

Table 2: Comparison Of Knee Joint Pain And Physical Inability Among Geriatrics With Osteoarthritis Within And Between The Interventional And Placebo Group.

N = 60(30+30)

Knee Joint Pain and physical inability	Pretest		Post Test		Mean Difference Score	Paired 't' test value
	Mean	S.D	Mean	S.D		
Interventional Group	76.07	6.89	41.70	11.94	34.37	t = 13.788 p=0.0001 S***
Placebo Group	75.07	7.68	75.03	6.99	0.04	t = 0.103 p=0.919 N.S
Mean Difference Score	1.0		33.33		***p<0.001 S - Significant N.S – Not Significant	
Student Independent 't' test & p-value	t = 0.530 p=0.598, N.S		t = 13.189 p=0.0001, S***			

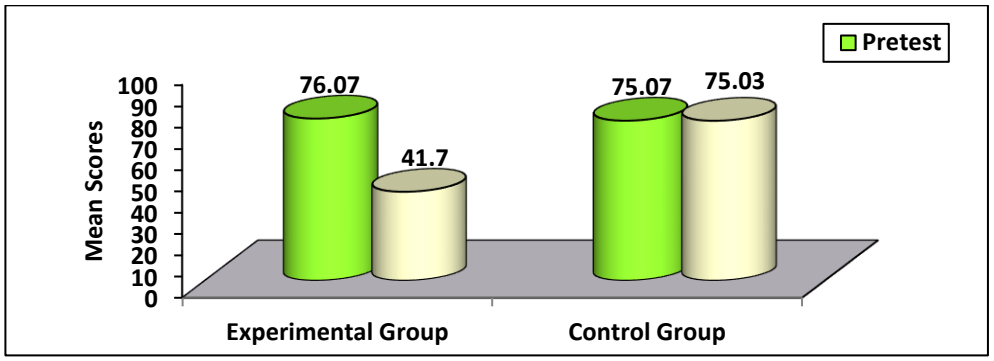

Figure:3 Comparison Of Knee Joint Pain And Physical Inability Among Geriatrics With Osteoarthritis Within And Between The Interventional And Placebo Group

The outcome of present study identified, that after implementation of hot fomentation with Epsom Salt among our study participant's showed a significant reduction in the level of pain perception and improvement in the physical ability. Epsom salts is a easily available product which is available in low cost and it has many health benefits. It is a substance rich in magnesium and sulfate, removes excess toxins from the body, alleviates pain and enhances healing process [21]. Dinesh Chandra Damor (2023) aimed in investigating the efficacy of Epsom salt water application among 30 study participant's among client's with osteoarthritis aiming in reducing the pain and enhancing functional abilities. The outcome of study concluded that, there was a significant reduction in the level of pain perception and improved their functional abilities among their study participant's after implementation of Epsom salt with hot water twice daily over a period of 10 days. [22]

Inflammation is an important aspect of the illness process in the instance of arthritis. According to a research, Epsom salts mixed with hot water can help reduce joint stiffness and pain due to arthritis without experiencing any adverse reactions It has been identified and reported that, Epsom salts mixed with hot water can help reduce joint stiffness and pain due to arthritis without experiencing any adverse reactions. Since the mineral magnesium, present in the Epsom salt is readily absorbed by the skin and has been proven to avert the activation of cytokines that cause inflammation. This simple intervention's possibilities could be effectively utilized to reduce discomfort resulting from arthritis. [23].Based on the above statement and the current study findings concluded that application of hot fomentation with Epsom salt has shown an improvement in reducing knee pain and enhanced the functional abilities without any adverse reactions.

Association Of Level Of Knee Joint Pain And Physical Inability Among Osteoarthritis With Osteoarthritis With Selected Demographic And Clinical Variables.

The demographic variables age ($F=4.450$, $p=0.012$) and type of family ($F=4.473$, $p=0.021$) had shown statistically significant association with posttest level of knee joint pain among geriatrics with osteoarthritis at $p<0.05$ and $p<0.01$ level respectively and the other demographic variables had not shown statistically significant association with posttest level of knee joint pain among geriatrics with osteoarthritis at $p<0.05$ level in the interventional group.

Association Of Post Test Level Knee Joint Pain And Physical Inability Among Geriatrics With Their Selected Clinical Variables In The Interventional Group.

The clinical variables had not shown statistically significant association with posttest level of knee joint pain among geriatrics with osteoarthritis at $p<0.05$ level in the interventional group.

4. Conclusion

Based on the findings of the current study, it was evident that, there was significant effect on hot fomentation with Epsom salt enhanced the pain reduction among geriatrics with osteoarthritis Therefore, hot fomentation with Epsom salt can be implemented as an alternative treatment by all the health care professionals in an effort to alleviate the knee pain among osteoarthritis clients as a part of nursing care to minimize the complications that arise out of taking oral analgesics or other drugs to reduce the pain perception

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successfully.

AUHTORS CONTRIBUTION

The authors conceived and designed the review, acquired, analyzed and interpreted the data, drafted the article, approved the version to be submitted and take full responsibility for the integrity of the work

CONFLICT OF INTEREST

Authors declare no conflict of interest.

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