ORIGINAL ARTICLE

Comparison between trichloroacetic acid solution 50% and hydrogen peroxide solution 40% in cases diagnosed clinically and dermoscopically as seborrheic keratosis

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Abstract

Background: ***Epidermal tumors, such as seborrheic keratosis (SK), are common in middle-aged and older people. SK develops when immature keratinocytes benignly proliferate, leaving behind flat, round, or oval macules that are easily distinguished. They don't usually develop quickly, can get thicker with time, and almost never go away on their own.***

Aim and objectives: ***To compare the efficacy and safety of hydrogen peroxide (H_2O_2) 40% solution versus trichloroacetic acid (TCA) 50% solution in the treatment of seborrheic keratosis.***

Patients and methods: ***This randomized control trial carried out on 100 patients diagnosed clinically and dermoscopically as SK attending at El-Hussein hospital, Al-Azhar University, Cairo from April 2023 to November 2024. Patients were divided into two equal groups: Group A: received topical hydrogen peroxide 40% solution was used every 3 weeks for 3 months and Group B: received topical TCA 50% solution was used every 3 weeks for 3 months.***

Results: ***While differences in improvement according to location were statistically significant, differences according to gender, age, and smoking status were not.***

Conclusion: ***Our study revealed that, although H_2O_2 solution 40% provides significant improvement in treatment of SK, topical TCA 50% solution is more effective. In two groups the site affects the precent of improvement.***

Keywords: Seborrheic keratosis; Hydrogen peroxide (H_2O_2); Trichloroacetic acid (TCA)

1. Introduction

The elderly and middle-aged are particularly prone to seborrheic keratosis (SK), an epidermal malignancy. Well-defined, flat, round, or oval macules are the benign outcome of immature keratinocyte proliferation, the etiology of SK. Their growth rate is usually modest, their thickness can rise with time, and they almost never go away on their own.[1]

On a histopathological examination, keratinocyte growth with cysts packed with keratin is the hallmark of SK. In irritated or inflammatory lesions, lymphocytic infiltration might be observed. While one subtype is usually predominant in each lesion, the severity of hyperkeratosis, acanthosis, pseudo cysts, hyperpigmentation, inflammation, and dyskeratosis can vary according to the subtype.[2]

Surgery for SK can use a variety of techniques, including electrossication, curettage, shave excision, cryotherapy, and ablative laser. These methods often have the undesirable side effects of recurrence, scarring, and pigmentary alterations. One possible approach to treating SK is the use of topical pharmacological treatments.

Accepted 19 January 2025.
Available online 31 March 2025

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https://doi.org/10.21608/aimj.2025.446482

Although some of these earlier treatments have worked against SK, none of them have been shown to be effective against all cases, and SK lesions often return. Research into potential new medical treatments for SK has stalled in recent years. There is still a lack of clarity regarding the molecular pathways that initiate and progress SK.[3]

When applied topically, trichloroacetic acid (TCA) triggers coagulative necrosis of skin cells and the precipitation of proteins. Necrosis of collagen in the upper reticular dermis and papillary dermis occurs at higher concentrations. A few days later, the chemically unharmed germinative portions of hair follicles undergo epithelialization, and the necrotic layers peel off.[4]

This study aims to examine the safety and effectiveness of two solutions for treating seborrheic keratosis: one containing 40% H_2O_2 and the other 50% TCA.

2. Patients and methods

This randomized control trial carried out on 100 patients diagnosed clinically and dermoscopically as SK attending at El-Hussein hospital, Al-Azhar University, Cairo from April 2023 to November 2024.

Ethical consideration:

Before beginning the trial, we got approval from Al-Azhar University's medical ethics council. We also made sure that all patients understood what was about to happen and got their signed agreement.

Inclusion criteria

Patients without topical treatment for SK were both male and female, and their ages varied from 30 to 70 (the peak prevalence of SK is in this age group). 6 months prior to the start of the research.

Exclusion criteria

Exclusion criteria included SKs in intertrigoneous spaces or close to the eyelids, as well as sun exposure during treatment.

Methods

All patients will be subjected to the following.

No one took part in the study without first obtaining their written consent. A thorough patient history and physical history are taken. Clinical and dermoscopy-based dermatological evaluations.

Treatment:

Patients were divided into two groups of 50 patients each. Group A received a topical H_2O_2 40% solution, which was used every 3 weeks for 3 months. Group B was received topical TCA 50% solution was used every 3 weeks for 3 months.

Clinical assessment:

Before and after treatment, SKs were rated using the physician's lesion assessment (PLA) scale, as per Baumann et al. The system for scaling is as follows:

A clear sky with no visible SKs is represented by the number 0. 1. Almost visible. 2. A shallow SK that is 1mm deep or thinner. 3: A significant SK that is deeper than 1mm. A ruler marked in millimeters and centimeters was used to measure the thickness.

The clinical improvement will be categorized into 4 grades:

Impressive progress (75 to 100% clearance). Clearance rates of 50–75% indicate moderate improvement. Gradual improvement (25–50%) in clarity. Only a small improvement, less than 25% clearing.

Statistical Analysis

Using an IBM-compatible PC, the data were reviewed, validated, described, and analyzed using SPSS (Statistical Package for the Social Sciences) version 26.0.0, Microsoft Office Excel 2021, and GraphPad Prism 6.

Mean, median, standard deviation (SD), minimum, maximum, range, and percentages were the outputs of the descriptive statistics run on each study parameter across all three groups. If any cell's predicted count was less than 5, the Fisher exact test was employed instead of the Chi-square test to compare the two groups' qualitative data. We used independent t-tests to compare two groups with parametric distributions and quantitative data. The significance level was determined using the following probability (P) values: NS = non-significant ($P > 0.05$), S = significant ($P < 0.05$), and HS = highly significant ($P < 0.001$).

3. Results

Table 1. Information on the cases' demographics.

		NO.=100
GENDER	Female	51(51.0%)
	Male	49(49.0%)
AGE	Mean ± SD	59.46±6.89
	Range	38-70

The age ranged from 38 to 70 years (mean 59.46 years) and there were 51 cases Female and 49 cases were Male, (table 1; figure 1).

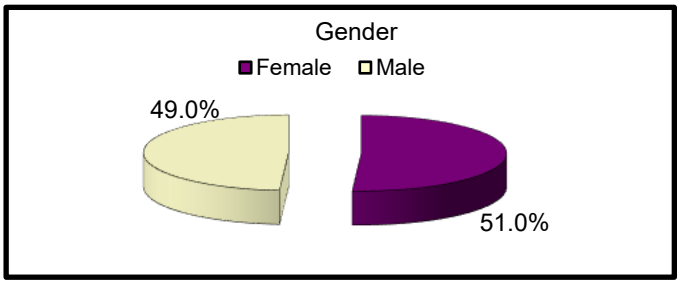

Figure 1. Distribution of the studied cases according to gender.

Table 2. Evaluation of Groups A and B with respect to age and gender.

		GROUP A	GROUP B	TEST VALUE	P-VALUE	SIG.
		No. = 50	No. = 50			
GENDER	Female	28 (56.0%)	23 (46.0%)	1.000*	0.317	NS
	Male	22 (44.0%)	27 (54.0%)			
AGE	Mean ± SD	59.52 ± 6.18	59.40 ± 7.60	0.087•	0.931	NS
	Range	43 – 69	38 – 70			

Results from the chi-square test and the independent t-test are considered significant when the p-value is less than 0.05, and very significant when the p-value is less than 0.01

The mean of age (years) for patient in group A was 59.52 ± 6.18 and it was 59.40 ± 7.60 for patients in group B, and this was statistically insignificant. In Group A, there were 56.0% cases were female and 44.0% cases were male, while in Group B there were 46.0% cases were female and 54.0% cases were male, and this was statistically insignificant, (table 4; figure 2,3).

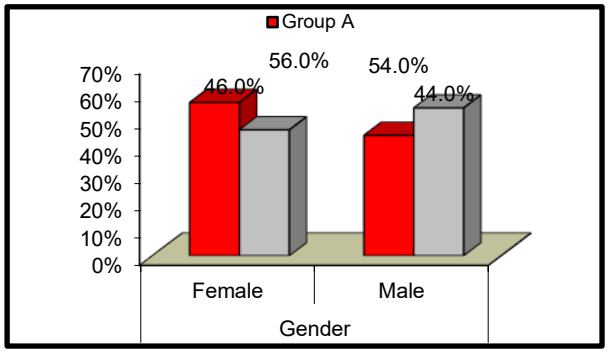

Figure 2. Comparison between studied groups regarding gender.

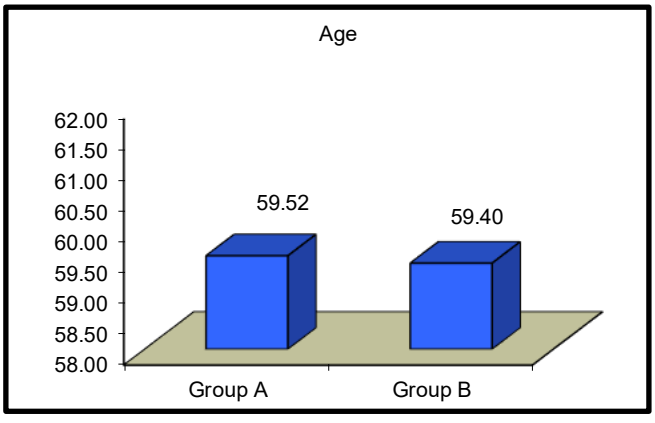

Figure 3. Comparison between studied groups regarding age.

Table 3. Evaluation of Groups A and B with Respect to Site.

SITE	GROUP A		GROUP B		TEST VALUE	P-VALUE	SIG.
	No.	%	No.	%			
FACE	36	72.0%	38	76.0%	0.721*	0.868	NS
BACK	6	12.0%	6	12.0%			
CHEST	4	8.0%	4	8.0%			
NECK	4	8.0%	2	4.0%			

For a chi-square test, a p-value more than 0.05 indicates non-significant (NS), for a p-value less than 0.05 indicates significant (S), and for a p-value less than 0.01 indicates highly significant (HS)

Regarding the site there were 36 cases had face, 6 cases had back, 4 cases had chest and 4 case had neck in group A, while in Group B there were 38 cases had face, 6 cases had back, 4 cases had chest and 2 case had neck, and this was statistically insignificant, (table 3; figure 4).

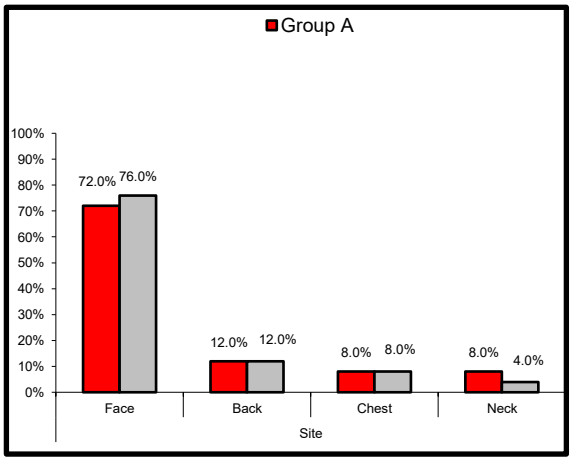

Figure 4. Comparison between studied groups regarding site.

Table 4. Evaluation of Group B's and Group A's Progress.

IMPROVEMENT	GROUP A		GROUP B		TEST VALUE	P-VALUE	SIG.
	No.	%	No.	%			
EXCELLENT	7	14.0%	15	30.0%	13.847*	0.008	HS
MODERATE	8	16.0%	16	32.0%			
MILD	8	16.0%	9	18.0%			
MINIMAL	10	20.0%	5	10.0%			
NON	17	34.0%	5	10.0%			

Results from the chi-square test and the independent t-test are considered significant when the p-value is less than 0.05, and very significant when the p-value is less than 0.01

In group A there were 7 cases had excellent improvement, 8 cases had moderate improvement, 8 cases had mild improvement, 10 case had minimal improvement and 17 cases had non-improvement, In Group B, on the other hand, there was a highly significant distribution of outcomes: 15 cases showed great improvement, 16 cases showed considerable improvement, 9 cases showed mild improvement, 5 cases showed limited improvement, and 5 cases showed no change at all, (table 4; figure 5).

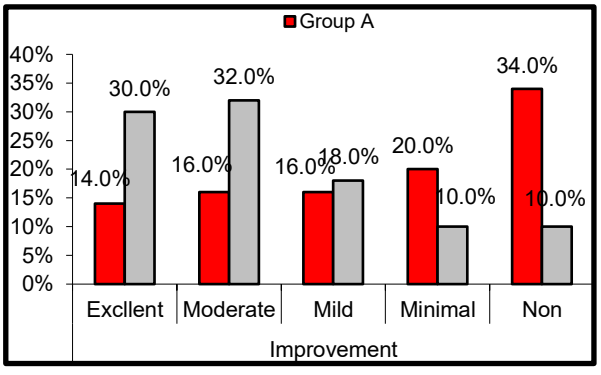

Figure 5. Comparison between studied groups regarding improvement.

Table 5. Comparison between improvement and gender, age, site and smoking in group A.

GROUP A		EXCELLENT IMPROVEMENT	MILD IMPROVEMENT	MINIMAL IMPROVEMENT	MODERATE IMPROVEMENT	NON IMPROVEMENT	TEST VALUE	P-VALUE
		No. = 7	No. = 8	No. = 8	No. = 10	No. = 17		
GENDER	Female	3 (42.9%)	4 (50.0%)	6 (60.0%)	5 (62.5%)	10 (58.8%)	0.865*	0.930
	Male	4 (57.1%)	4 (50.0%)	4 (40.0%)	3 (37.5%)	7 (41.2%)		
AGE	Mean ± SD	57.29 ± 7.91	60.88 ± 5.84	60.20 ± 4.94	57.50 ± 6.65	60.35 ± 6.25	0.627£	0.645
	Range	45 – 66	54 – 67	54 – 66	43 – 64	45 – 69		
SITE	Face	6 (85.7%)	6 (75.0%)	2 (20.0%)	8 (100.0%)	14 (82.4%)	22.049*	0.037
	Back	1 (14.3%)	1 (12.5%)	3 (30.0%)	0 (0.0%)	1 (5.9%)		
	Chest	0 (0.0%)	1 (12.5%)	3 (30.0%)	0 (0.0%)	0 (0.0%)		
	Neck	0 (0.0%)	0 (0.0%)	2 (20.0%)	0 (0.0%)	2 (11.8%)		
SMOKING	No	6 (85.7%)	7 (87.5%)	7 (70.0%)	7 (87.5%)	15 (88.2%)	1.846*	0.764
	Yes	1 (14.3%)	1 (12.5%)	3 (30.0%)	1 (12.5%)	2 (11.8%)		

Any p-value greater than 0.05 is considered non-significant (NS), any p-value less than 0.05 is considered significant (S), and any p-value less than 0.01 is considered highly significant (HS). This applies to both the chi-square test and the one-way ANOVA test

While differences in improvement according to location were statistically significant, differences according to gender, age, and smoking status were not, (table 5).

Table 6. Comparison between improvement and gender, age, site and smoking in group B.

GROUP B		EXCELLENT IMPROVEMENT	MILD IMPROVEMENT	MINIMAL IMPROVEMENT	MODERATE IMPROVEMENT	NON IMPROVEMENT	TEST VALUE	P-VALUE
		No. = 7	No. = 8	No. = 8	No. = 10	No. = 17		
GENDER	Female	6 (40.0%)	4 (44.4%)	2 (40.0%)	8 (50.0%)	3 (60.0%)	0.796	0.939
	Male	9 (60.0%)	5 (55.6%)	3 (60.0%)	8 (50.0%)	2 (40.0%)		
AGE	Mean ± SD	56.67 ± 7.81	60.67 ± 7.71	56.20 ± 10.94	61.63 ± 6.18	61.40 ± 6.54	1.220	0.316
	Range	38 – 68	44 – 68	39 – 66	50 – 70	55 – 69		
SITE	Face	15 (100.0%)	8 (88.9%)	4 (80.0%)	6 (37.5%)	5 (100.0%)	22.519	0.032
	Back	0 (0.0%)	1 (11.1%)	1 (20.0%)	4 (25.0%)	0 (0.0%)		
	Chest	0 (0.0%)	0 (0.0%)	0 (0.0%)	4 (25.0%)	0 (0.0%)		
	Neck	0 (0.0%)	0 (0.0%)	0 (0.0%)	2 (12.5%)	0 (0.0%)		
SMOKING	No	12 (80.0%)	7 (77.8%)	4 (80.0%)	13 (81.2%)	4 (80.0%)	0.043	1.000
	Yes	3 (20.0%)	2 (22.2%)	1 (20.0%)	3 (18.8%)	1 (20.0%)		

Results from the chi-square test and the one-way analysis of variance (ANOVA) are considered significant when the p-value is less than 0.05, and highly significant when the p-value is less than 0.01

While differences in improvement according to location were statistically significant, differences according to gender, age, and smoking status were not, (table 6).

Figure 6. Studied cases treated with H_2O_2 solution 40%.

(the beginning of the arrow indicates after treatment and the end of the arrow indicates before treatment).

Figure 7. Studied cases treated with Trichloroacetic acid solution 50%.

(the beginning of the arrow indicates after treatment and the end of the arrow indicates before treatment).

4. Discussion

The production of free radicals and their role as a molecular oxidant are two ways in which H_2O_2, an endogenous reactive oxygen species, adds to oxidative stress. In addition to its safety, this review covered the various clinical uses of topically applied H_2O_2 (1%-45% concentration). The antibacterial and debriding effects of hydrogen peroxide at concentrations ranging from 1% to 6% make it an attractive option for use in wound care at lower concentrations. Additional research is required to confirm that H_2O_2 aids in the healing of wounds other than venous insufficiency ulcers.[5]

Involuntary proliferation of immature keratinocytes makes up SK, a prevalent kind of epidermal malignancy. Solitary or numerous brownish papules or plaques with a verrucous surface, typically found on the head, neck, and trunk areas, are the clinical manifestations of SK. The tumor grows slowly; thus, many lesion removal surgeries are performed for aesthetic reasons or because traumatized lesions become painful.[6]

With a mean age of 59.46 years and a range of ages from 38 to 70, our study included 51 female cases and 49 male cases. Neither group differed significantly in terms of age nor gender.

In agreement with our study, Agrawal et al.,[7] performed on eighty-five SK patients. Two groups of patients were randomly assigned to receive different treatments: one group received 40% H_2O_2 and the other 50% TCA. The sexes and ages of the two groups were similar.

In addition, forty percent of the HP and vehicle were compared in a study conducted by Baumann et al.,[8] this year (2018). Both studies included 487 individuals; study 1 included 223 patients given HP and 227 given a control group, and study 2 included 244 patients given H_2O_2 and 243 given a control group. The average age was 68.7 years, and there were both male and female patients (58% of the total).

Group A had 36 cases of face, 6 cases of back, 4 cases of chest, and 4 cases of neck; group B had 38 cases of face, 4 cases of chest, and 2 cases of neck; nevertheless, there was no statistically significant difference between the two groups.

Comparable to our study, Fawzy et al.,[9] One hundred individuals, both male and female, were included in the study. All of them had seborrheic keratosis, and some of them had cherry angiomas. Of those, 62% had cherry angiomas and 38% did not. The majority of cases (76%) of SK were found on the face.

Also, there was strong agreement between the results and Lin et al.,[10] in which the face and trunk accounted for the majority of lesions (40.0 and 38.5%, respectively), with the extremities coming in at 14.2%, the neck at 4.1%, and the scalp at 3.4%.

It is worth noting that there was a highly statistically significant difference between Group A and Group B. In Group A, 7 cases showed excellent improvement, 8 cases moderate improvement, 10 cases mild improvement, 17 cases minimal improvement, and 15 cases no improvement. In Group B, 16 cases showed moderate improvement, 9 cases showed mild improvement, 5 cases showed minimal improvement, and 5 cases showed no improvement were recorded.

Similarly, Abdelgawad et al.,[11] demonstrated that the treatment group made more progress. After treatment, patients' physician lesion assessments (PLAs) differed significantly from those of the control group ($p = 0.000$).

Also, Baumann et al.,[8] discovered that a statistically significant number of patients in the HP group were able to attain full clearance compared to the vehicle group.

Disagree with Salecha et al.,[12] Forty patients made up the sample, and they were split evenly between two groups for the study. The first group received 40% H_2O_2 and the second 50% TCA. The results showed that patients given hydrogen peroxide had a 45% success rate in reaching a total clearance on the PLA scale, compared to 25% in TCA, with a significant p-value of less than 0.0001. Since they included patients aged 60 to 80, the discrepancy might be attributable to the varied age groups.

While gender, age, and smoking status did not show any statistically significant differences in this study, there was a significant difference in improvement and site in groups A and B.

Agrawal et al.,[7] It was observed that the mean PLA score in group A reduced considerably from 3 to 1.79 (40.3%) at two weeks of treatment and to 0.63 (79%) at six weeks of treatment ($P < 0.001$). Group B exhibited a reduction in PLA score of 2.41 (19.7%) at two weeks of treatment and 1.13 (62.3%) at 6 weeks ($P < 0.001$).

4. Conclusion

Our study revealed that, although H_2O_2 solution 40% provides significant improvement in treatment of SK, topical TCA 50% solution is more effective. In two groups the site affects the precent of improvement.

Disclosure

The authors have no financial interest to declare in relation to the content of this article.

Authorship

All authors have a substantial contribution to the article

Funding

No Funds : Yes

Conflicts of interest

There are no conflicts of interest.

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