Effects of Oil Pulling On Chemo-radiotherapy Induced Oral Mucositis in Head and Neck Cancer Patients

Fizza Saher[1]	**BDS**
Mervyn Hosein[2]	**FDS RCS (Eng), FDS RCSE(Edin), FFDRCSI(Ire)**
Abne Hasan[3]	**M.D.**
Jabbar Ahmed Qureshi[4]	**BDS**
Tazein Amber[5]	**MBBS**
Nisa Fatima Sunderjee[6]	

OBJECTIVE: To compare the effects of coconut oil pulling on chemo-radiotherapy induced oral mucositis in head and neck cancer patients with Magic mouthwash.

METHODOLOGY: This was a double-blind, randomized controlled trial, total of n=80 patients of chemo-radiotherapy induced oral mucositis of head and neck cancer were randomized into two arms A and B. A= Oil pulling using pure coconut oil and B= commercially prepared Magic Mouthwash. Each arm consisted of n=40 patients evaluated for a total duration of nine weeks using the WHO scale of oral mucositis and four different pain scores including Verbal pain intensity scale, Numeric pain intensity scale, Visual analog scale and FACES scale. Patients were evaluated at baseline 0, week 3, 6 and 9.Data was analyzed by using SPSS version 20.

RESULTS: Total of n=72 participants completed the study between December 2017 to August 2018; randomly assigned to Group A (n=36) and group B (n=36).Of these n=48 were male and n=24 female. In both groups there was a reduction in WHO oral mucositis scores over the time of nine weeks; however, the differences were not statistically significant (p=0.633). The two treatments did not differ on the main outcome measure i.e. WHO mucositis scale from baseline, or on any other measure of pain, while followed for the nine weeks of trial period. Adverse effects were similar between the two arms and the most frequently reported side effects were radiation induced rash, mouth fatigue and dry mouth.

CONCLUSION: Oil pulling and magic mouthwash was similar in reducing both the severity of oral mucositis and relieving the pain of chemo radiation induced oral mucositis in head and neck cancer patients. Oil pulling with coconut oil can be used as an alternative therapy to magic mouthwash for treating chemoradiation induced oral mucositis.

KEY WORDS: Oral mucositis, oil pulling, magic mouthwash, coconut oil.

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INTRODUCTION

Globally, the sixth most frequently encountered cancers are head and neck cancers (HNC), categorized into cancers of lip and oral cavity, pharynx, larynx, tongue, salivary glands, nasal cavity and paranasal sinus.[1] It is the ninth most frequent cause of death worldwide.[2] Amongst all HNC, the second most prevalent and often diagnosed cancer in Pakistan are of lip and oral cavity.[3] Its proportion is much higher in males as compared to females with ratio of 2:1.[4] Almost over 90% of all head and cancers are squamous cell carcinomas (HNSCC).[5] Based on the Grading, the treatment of HNSCC includes Surgery, Radiotherapy and Chemotherapy. Patients with or without surgery and having locally advanced head and neck cancers, the concomitant chemo-radiation is the standard protocol followed worldwide.[6]

Oral mucositis is the most frequently occurring complication of chemo- radiotherapy for cancer treatment. About 40% of patients who undergo chemo-radiation encounter this as the earliest symptom.[7] According to a

1. Lecturer, Department of Oral Biology, Ziauddin College of Dentistry Karachi.
2. Dean, Ziauddin College of Dentistry, Ziauddin University, Karachi.
3. Consultant Radiation Oncologist, Department of Radiation Oncology, Ziauddin Cancer Hospital Karachi.
4. Lecturer, Department of Pharmacology, Ziauddin College of Medicine.
5. Resident, Department of Internal Medicine, Aga Khan University Hospital.
6. Student, Ziauddin College of Medicine.

Corresponding author: "Dr. Fizza Saher" < fizza.saher@zu.edu.pk >

study, the frequency of acute mucositis towards the end of the first week of chemo-radiation is about 33.3% which gradually progresses until the end of the fifth week to 93.3%.[8] Patients usually report with oral soreness, severe pain, discomfort, and gastrointestinal distress, independent of the grade or severity of mucositis. During chemo radiotherapy, the mucosa becomes highly prone to injury due to the rapid rate of mitosis in oral tissues and pain is reported to be the most in tolerable symptom.[9] Mucositis can directly affects the appetite resulting in weight loss, it can cause difficulty in speech and swallowing, severe dehydration and systemic infections which indirectly affect patient's quality of life and financial burdens related to the treatment. Extreme cases of oral mucositis can hinder the deliverance of radiotherapy; hence the effectiveness is compromised with treatment interruptions.[10,11] These interruptions can compromise patients health and also directly affect the chances of survival.[12,13]

Most common treatment for such symptoms is Magic mouthwash, which is prescribed to patients for relieving the oral symptoms related to cancer therapy. The combination of a topical analgesic, steroid, antifungal , antibacterial and (perhaps) a mucosal coating agent is included in the formulation but there is no standard recipe for this preparation.[14] Some possible side effects may include a burning or itching in the mouth, nausea, diarrhea and drowsiness is less likely to occur. It may also alter the taste sensation, resulting in loss of appetite.[15]

Oil pulling is a well known ancient herbal procedure that includes prolonged swishing of oil in the oral cavity to improve oral environment. "Oil pulling" is not a new concept and around 3000BC oil pulling had been discussed in Ayurvedic texts. During 1990's in Russia the concept of oil pulling was reinvented by Dr. F. Karach.[16] It is currently a well renowned Complementary and Alternative Medicine remedy for different illnesses.[17] Oil pulling is claimed to reduce the chances of dental caries, bleeding gums, halitosis, xerostomia, cracked lips and for improving overall health related to teeth, gums, and jaws.[18] Oil pulling can be an alternative cleaning method in those patients where brushing is difficult as in mouth ulceration, or in those who have a tendency to gag as in asthmatics and severe cough.[19] In oil pulling, a teaspoonful of any kind of oil is swished around the mouth early in the morning preferably before having breakfast, for about 15-20 minutes. The oil is 'pulled' and forced around the oral cavity and at the end the viscous oil should become milky white and thinner, if the guidelines to oil pulling have been followed appropriately. It is then expectorated; the mouth is thoroughly washed with warm saline or normal tap water followed by routine tooth brushing. The therapy can be limited to five to ten minutes, if jaw aches.[20] The procedure is useful in number of systemic diseases like diabetes, bronchitis, thrombosis, asthma and eczema.[21]

The oils which are commonly used are coconut oil, sesame oil, palm oil and sunflower oil.[18] Coconut oil is commonly and culturally used throughout the sub continent especially in India and Pakistan. Coconut oil has an exceptional role in the diet with added health and nutritional benefits as it acts as an anti-inflammatory, immune modulator[22], moisturizer and wounds healer.[23,24] Oil pulling (coconut oil) was used in this study as it is assumed to reduce inflammatory effects and provide additional health benefits to the oral mucosa. The objective of the study was to compare the effects of coconut oil pulling versus "Magic" mouthwash on chemo-radiotherapy induced oral mucositis in head and neck cancer patients.

METHODOLOGY

This was a multi institutional, double-blinded, randomized controlled trial conducted at the Department of Radiation Oncology at Ziauddin Hospital North Nazimabad and Atomic Energy Medical Center at JPMC between December 2017 and August 2018. This study received approval from the ethical review committee of Ziauddin University (Ref no. 0411117FSOB). Eligible participants were histopathologically proven consecutive head and neck cancer patients aged between 25 to 65 years, who underwent chemo-radiotherapy, with or without primary surgery. Exclusion criteria included patients whose oral examination was not possible due to limited mouth opening, inability to perform the treatment regimen and patients not willing to stop deleterious habits like consumption of Pan and betel nut, smoking or alcohol. All patients were treated with conventional fractionation (5 fractions every week) with a dose between 60-70 Gy. Sample size was calculated by sealed envelope software. Total sample came out to 62 which were increased to 90 patients to reduce the dropout error and patient's lost to follow-up. The significance level was taken at 5% and power or confidence interval at 90 %, standard deviation of 2.65 and non inferiority limit or bound of error was taken at 2.

PREPARATION AND DISPENSING OF OIL AND MAGIC MOUTHWASH

Magic mouthwash was prepared by Ziauddin Hospital pharmacy Clifton campus. The constituents of mouthwash include Mucaine (aluminum hydroxide), Vicous Xylocaine and Hydryllin (diphenhydramine). Commercially available pure coconut oil (C.B.C imported from Malaysia) shown in

Fig 1a was purchased from the local market, the composition of which is shown in Fig1b. The trial was kept double blinded to eradicate the observer bias. A third person (lab assistant) who was not part of the study was given the task to dispense both the specimens. The oil and mouthwash was dispensed in the dark amber colored bottles of same size and shape having the same amount Fig 1c and d, packed individually in separate brown colored opaque envelopes. The envelopes were coded according to the group distribution and at the time of dispensing the investigator were kept uninformed from the group labeling i.e. A and B.

Figure 1: (a) locally available imported pure coconut oil (b) composition of coconut oil (c) (d) Batches of group A and group B bottles.

RANDOMISATION AND TRIAL INTERVENTIONS

Patients who fulfilled the inclusion criteria and had given the consent for the trial for nine weeks were registered for the study. Before starting the chemo-radiation, enrolled patients were randomized (1:1) to the group A (coconut oil pulling) or standard oral care regimen Group B (magic mouthwash). Randomization was performed by using the sealed envelope randomized sampling technique.[25] Patients were instructed to swish and then spit out 5ml (a teaspoon) of either the oil or Magic mouthwash 3 times daily on an empty stomach i.e. morning, afternoon and night for about minimum of 10 minutes for 9 weeks. Patients were advised not to eat and drink anything for about half an hour after swishing and were asked to start the use of oil or magic mouthwash from the day of their first radiation till the end.

EVALUATION AND DATA COLLECTION

The scoring of chemo-radiation induced oral mucositis was performed by WHO scale of oral mucositis and mucositis induced pain was evaluated using four different pain scores including Verbal pain intensity scale (VPS), Numeric pain intensity scale (NPS), Visual analog scale (VAS) and FACES scale (fig 2), at the following time points: baseline, week 3 during radiotherapy, week 6 and 9 post completion of radiotherapy.

Grade	Description
0	None
I	Oral soreness, erythema
II	Oral erythema, ulcers, patient can swallow solid and liquid food
III	Oral ulcers with extensive erythema; patient can swallow food (liquid diet only)
IV	Mucositis to extent that oral alimentation not possible

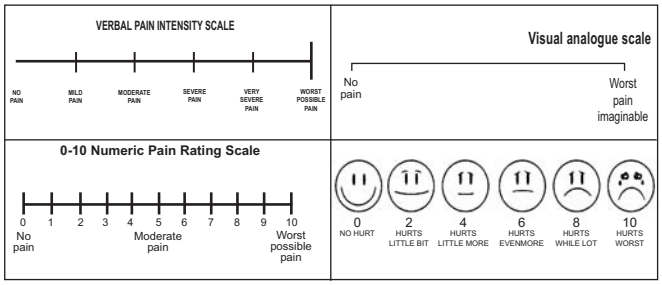


Figure 2: (a) WHO Oral mucositis scale and (b) Pain scales

STATISTICAL ANALYSIS

Statistical analysis was completed using SPSS version 20. Baseline characteristics were calculated through descriptive statistics. Continuous variables were expressed as means and Standard deviations and categorical variables were expressed as proportions. Association between WHO oral mucositis grades, Verbal Pain intensity scale and FACES scale was performed using Pearson Chi square, while Repeated Measure ANOVA was used to compare the Visual Analogue Scale and Numeric Pain Scale.

RESULTS

Total n=90 patients were interviewed and screened for the trial out of which n=6 patients did not fulfill the inclusion criteria and n=4 patients did not give consent. N=80 patients were then allocated to group A (oil pulling) and B (magic mouthwash) containing n=40 in each arm. During follow-up n=3 patients were lost in group A due to change in

radiation center and one due to death. In group B, n=2 were lost to follow up due to change in radiation center and n=2 due to discomfort and lack of compliance. In the end total n=36 patients in group A and n=36 in group B were evaluated and analyzed for the trial.

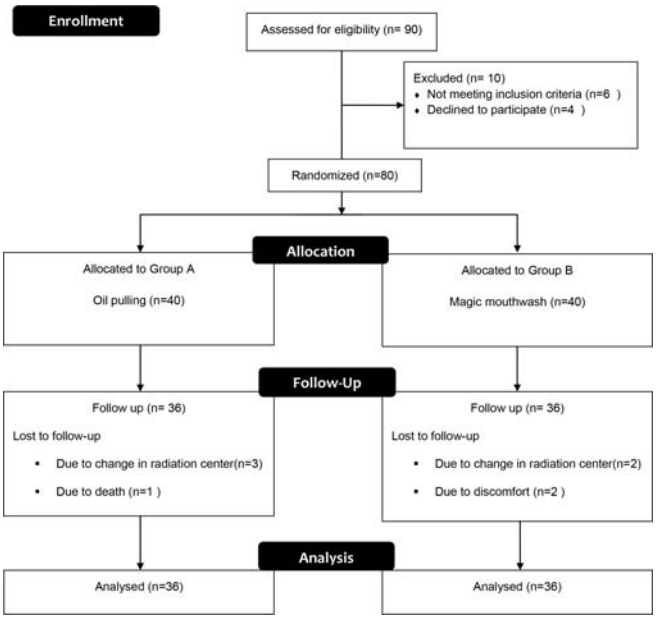


Figure 3: Consort Flow Chart

STUDY POPULATION AND DEMOGRAPHICS

The study population consisted of n=24(33.3%) women and n=48(66.7%) men, ranging from 25 to 65 years (mean 48.15 ± 10.79). Good patient compliance was observed in both arms.

Baseline characteristics were comparable between the two groups (Table 1). Majority of patients had their tumour in the buccal mucosa (40.3%) and most were Stage I tumors (31.9%). The reported deleterious habits showed Pan and Chalia (62.5%) as the most common habit. Almost all the patients had SCC (98.6) and only one had mucoepidermoid carcinoma (1.4%).Chemo-radiation were given to all of the study patients (100%).

Table 1: Baseline characteristics

	Coconut oil		Magic Mouthwash		Total	
	N	%	N	%	N	%
Age in years Mean S.D	48.42 10.41		47.89 11.31		48.15 10.79	
Gender						
Male	28	77.8	20	55.6	48	66.7
Female	8	22.2	16	44.4	24	33.3
Education						
Nil	5	13.9	10	27.8	15	20.8
Primary	8	22.2	16	44.4	24	33.3
Secondary	7	19.4	3	8.3	10	13.9
Matric	7	19.4	4	11.1	11	15.3
Inter	7	19.4	1	2.8	8	11.1
Graduate	2	5.6	2	5.6	4	5.6
Ethinicity						
Punjabi	5	13.9	2	5.6	7	9.7
Sindhi	6	16.7	9	25	15	20.8
Balochi	4	11.1	5	13.9	9	12.5
Pakhtun	3	8.3	4	11.1	7	9.7
Muhajir	17	47.2	16	44.4	33	45.8
Other	1	2.8	0	0	1	1.4
Deleterious Habits						
Smoking	9	25	9	25	18	25
Pan/Chalia	23	63.9	22	61.1	45	62.5
Naswar	9	25	10	27.8	19	26.4
Alcohol	1	2.8	2	5.6	3	4.2
Gutka	16	44.4	15	41.7	31	43.1
Site of tumour						
Lips	3	8.3	12	2.8	4	5.6
Buccal mucosa	14	38.9	15	41.7	29	40.3
Alveolar mucosa	8	22.2	7	19.4	15	20.8
Tongue	2	5.6	4	11.1	6	8.3
Palate	1	2.8	2	5.6	3	4.2
Floor of mouth	1	2.8	0	0	1	1.4
Larynx	4	11.1	3	8.3	7	9.7
Nasopharynx	2	5.6	1	2.8	3	4.2
Oropharynx	1	2.8	2	5.6	3	4.2
Salivary glands	0	0	1	2.8	1	1.4
Tumour size						
T1	4	11.1	3	8.3	7	9.7
T2	19	52.8	20	55.6	39	54.2
T3	9	25	9	25	18	25
T4	4	11.1	4	11.1	8	11.1
Nodal involvement						
N0	16	44.5	12	33.3	28	38.9
N1	13	36.1	16	44.5	29	40.3
N2	7	19.4	8	22.2	15	20.8
Metastasis						
Mo	33	91.7	35	97.2	68	94.4
M1	3	8.3	1	2.8	4	5.6
Stage						
1	14	38.9	9	25	23	31.9
2	7	19.4	12	33.4	19	26.4
3	7	19.4	10	27.8	17	23.6
4	8	22.2	5	13.9	13	18.1
Surgery						
With	28	77.8	31	56.1	59	81.9
Without	8	11.1	5	13.9	13	18.1
Histopathology						
Squamous cell carcinoma	36	100	35	97.2	71	98.6
Mucoepidermoid carcinoma	0	0	1	2.8	1	1.4

WHO ORAL MUCOSITIS SCALE

Of the 72 patients all reported grade 0(100%) at baseline in both the treatment groups (Figure. 4). At week 3 around 18 patients (50%) progressed to clinically significant grade 3 mucositis in each arm but association between grades of oral mucositis and intervention was statistically insignificant (p value 0.834). Overall reduction was seen at week 6 and the mucositis grade was found to be clinically significant as it reduces to grade 2 (34.6%) in group A and to grade 1 (43.9%) in group B, whereas association between grades of oral mucositis and intervention was statistically insignificant at week 6(p value 0.144). At the final follow-up week i.e. week 9, the mucositis had almost dropped to grade 0 in 52.4% of patients in group A and to 47.6% in group B. Association between grades of oral mucositis and intervention was statistically insignificant at week 9(p value 0.633) (Figure 5)

Figure 4: Frequency of grades of WHO mucositis scale on 3 weekly follow up

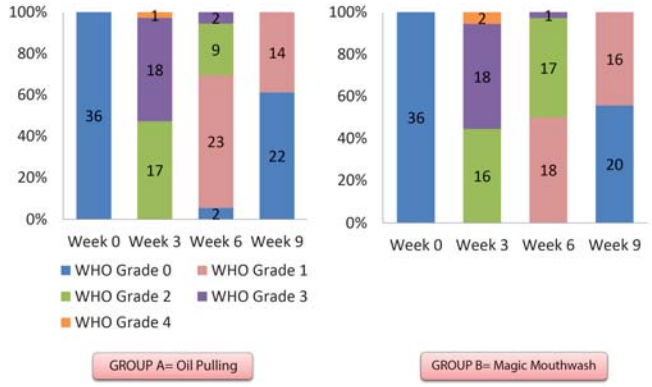
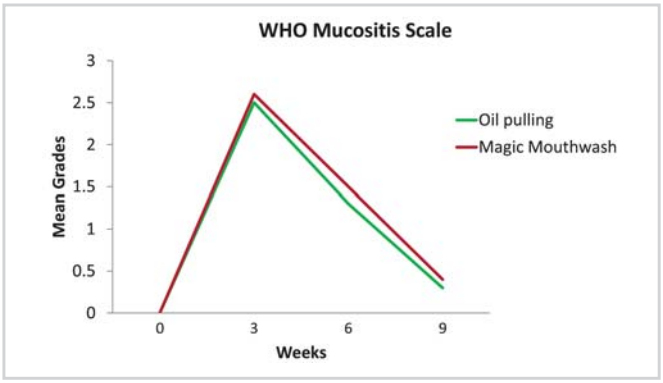


Figure 5: Comparison of Mean WHO mucositis scale



VISUAL ANALOG SCALE

At week 0 there was no sign of pain in both the groups whereas the scores increased at week 3(Figure 6a). Out of 36 patients, 11 recorded a score of 20mm (30.6%) in group B and highest score recorded was 60mm in 8 (22.2%) patients. In group A the highest score recorded was also 60mm but in 10 patients (27.8%) and the least score was 10mm recorded in only 1 (2.8%) patient. A repeated measures ANOVA with a Sphericity correction determined that mean VAS differed statistically significant between time points (F = 286, P< 0.0001). Post hoc tests using the LSD correction revealed that time elicited an increase in VAS from Week 0 to 3-weeks after induction in both groups (.00+/-.00 versus 38.2+/-16, P< 0.0001). However, there was a reduction in VAS from Week 3 to week 6(38.2+/-16 versus 20.1+/-12, P< 0.0001). Further reduction was observed in VAS from Week 6 to week 9(20.1+/-12versus5.5+/-8.5, P< 0.0001).There was no statistically significant difference in time* induction group interaction (F = .155, P<.926). Neither there was no difference between the two induction groups on VAS after chemo radiation (F = .012, P<.911).

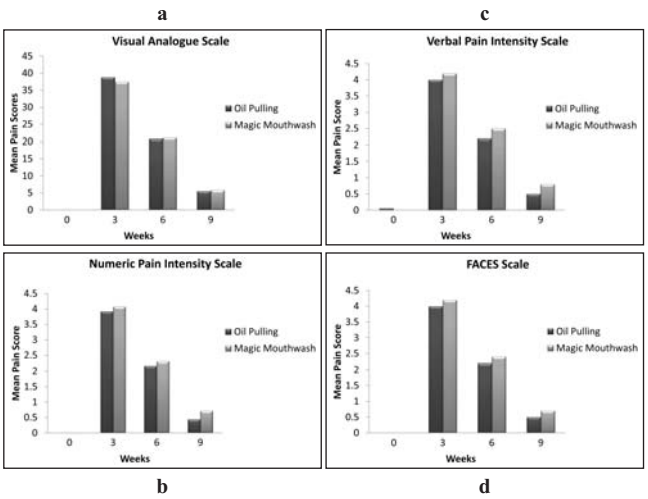


Figure 6: (a). Visual Analogue Scale (b). Numeric Pain Intensity scale (c). Verbal Pain intensity scale (d). FACES scale (A= oil pulling, B= Magic mouthwash)

NUMERIC PAIN INTENSITY SCALE

At week 0 both the groups were free of pain (100%). At week 3 the highest reading in group A was recorded as 6 in 9 (25%) patients while group B showed 8 as the highest recorded numeric point in 2 (5.6%) patients(Fig 6b). A repeated measures ANOVA with a Sphericity correction determined that mean Numeric pain intensity scale differed statistically significant between time points (F=318, P< 0.0001). Post hoc tests using the LSD correction revealed that time elicited an increase in Numeric pain intensity scale from Week0 to 3-weeks after induction in both groups (00+/-00 versus 4+/-1.58, P< 0.0001). At week 6 around 21 patients (58.3%) reported at scale 2 in group A with 20 (55.6%) patients in group B. However, there was a reduction in mean numeric pain intensity from Week 3 to week 6(4+/-1.58 versus 2.24+/-1.1, P< 0.0001). Further reduction was observed from Week 6 to week 9(2.24+/-1.1 versus .58+/-.9, P< 0.0001) as 27 patients (75%) were free of pain in group A and 21(58.3%) patients in group B. However there was no statistically significant difference in time* induction group interaction (F = .320, P<.811). Neither was there a difference between the two induction groups on Numeric pain intensity scale after chemo-radiation (F = .669, P<.416).

VERBAL PAIN INTENSITY SCALE

Out of 36 patients in group A only one patient suffered from mild pain (2.8%) at week (Fig 6c).Using Verbal pain intensity scale association between pain and intervention was statistically insignificant at 0 weeks (P value .314). At week 3, 18 (50%) patients suffered from moderate pain in

group A whereas only 14 patients (38%) had reported moderate pain in group B.

Using Verbal pain intensity scale association between pain and intervention was statistically insignificant at 3 weeks (P value .775). On the follow-up at week 6 both the groups showed similar data and almost 26 (72.2%) patients reported of mild pain. Using Verbal pain intensity scale association between pain and intervention was statistically insignificant at 6 weeks (P value 0.171). Week 9 showed that 21(58.3%) patients were free of pain while 15 had mild pain(41.7%) in group B. Group A showed 26(72.2%) patients had no pain out of 36 patients. Using Verbal pain intensity scale association between pain and intervention was statistically insignificant at 9 weeks (P value 0.216).

FACES SCALE

All patients in both the groups reported no pain at week 0 (Fig 6d). Around 16(44.4%) patients in group A and 18(50%) patients in group B reported at." hurts little more". Using Faces scale association between pain and intervention at week 3was insignificant (p value 0.374). At week 6, 24(66.7%) patients in group A while 26(72.2%) patients in group B reported at scale "hurts little bit". Using Faces scale association between pain and intervention at week 6was insignificant (p value 0.379). At week 9, 23(63.9%) patients in group B while 27(75%) patients were free of pain. Using Faces scale association between pain and intervention at week 9 was insignificant (p value 0.306).

ADVERSE EFFECTS

At the end of the study the most frequently encountered adverse effect were radiation rash, mouth fatigue and dry mouth (Table 2). However in Group A, n=34(94.4%) patients and in group B, n=36(100%) patients suffered from radiation induced rash. Nausea and vomiting was the least occurring adverse effects in both the arms (Group A= 1, Group B=2). Mouth fatigue was the second most common adverse effect reported in both the groups. Group A had n=27(75%) patients whereas group B had n=23(63.9%) no. of patients who experienced mouth fatigue followed by dry mouth that occurred in n=11(30.6%) in group B and n=5(13.9%) patients in group A.

Adverse effects		Oil Pulling		Magic Mouthwash	
		Frequency	%	Frequency	%
Nausea	Yes	1	2.8	2	5.6
	No	35	97.5	34	94.4
Vomiting	Yes	1	2.8	1	2.8
	No	35	97.5	35	97.2
Diarrhea	Yes	4	11.1	11	30.6
	No	32	88.9	25	69.4
Constipation	Yes	3	8.3	2	5.6
	No	33	91.7	34	94.4
Radiation Rash	Yes	34	94.4	36	100
	No	2	5.6	0	0
Mouth Fatigue	Yes	27	75	23	63.9
	No	9	25	13	36.1
Dry mouth	Yes	5	13.9	11	30.6
	No	31	86.1	25	69.4

Table 2: Frequency of Adverse effects encountered in group A and group B

DISCUSSION

To the best of our knowledge, till today no trial has been done on the efficacy of oil pulling on chemo-radiation induced oral mucositis. This trial compared the effects of coconut oil pulling with the conventional treatment (magic mouthwash) given to the chemo-radiation induced oral mucositis patients. We found that there is no statistically significant difference between the two treatment modalities in reducing the severity of the oral mucositis with its associated pain. The two interventions did not differ on the primary outcome measure i.e. WHO mucositis scale from day 0, or on any other scales of pain, when followed across the nine weeks of trial period.

As there is no available data of using oil pulling in chemo radiation induced oral mucositis, we are unable to compare the effects of oil pulling with other studies. Up to now, only palifermin, (a recombinant keratinocyte growth factor), has shown significant decrease in the severity and duration of radiation-induced mucositis in HNC.[6,26] Other treatments, including artificial saliva, antimicrobial agent and analgesics, do not sufficiently control the condition.[27] No researcher has ever used coconut oil for the reduction of oral mucositis but our results are in agreement with the study done by Suresh Rao et al in 2014 in which they found that gargling with turmeric by head and neck cancer patients undergoing radiation therapy provided significant benefit by delaying and reducing the severity of mucositis.[28] Triclosan mouthwash was also effective than sodium bi carbonate mouthwash in minimizing chemo-radiation induced oral mucositis with early reversal of symptoms towards the end of chemo-radiation.[29]

Currently, there are only a couple of effective medicines present available for the treatment of chemo-radiation induced oral mucositis but the most broadly endorsed topical treatment is a pharmacist prepared liquid mouthrinse commonly known as "magic mouthwash".[30,31] McGuire et al, proved that the pain relief from these mouthwashes is temporary and they could not be used for the prevention or treatment of mucositis.[32] According to Kuk et al, mouthwash containing diphenhydramine plus sucralfate, nystatin and dexamethasone was when compared with benzydamine, showed no significant decrease in oral mucositis.[33,34] Sarvizadeh et al, showed that morphine was more effective in limiting the progression of

oral mucositis in chemo-radiation patients when compared with the magic mouthwash containing magnesium aluminum hydroxide, viscous lidocaine, and diphenhydramine (also used in our trial).[35]

In our study we used pure coconut oil for alleviating oral mucositis and its related pain, because of its anti inflammatory effects. According to an animal study done by S. Intahphuak et al. virgin coconut oil was useful in the reduction of ear and paw edema. The results showed significant anti inflammatory and anti-nociceptive effects, when virgin coconut oil (VCO) was given in high doses. VCO also inhibits inflammatory markers like prostaglandins, bradykinin, and histamine responsible for pain and edema formation.[36] In a clinical trial, Daddy et al found that virgin coconut oil was equally effective as triamcinolone for the management of minor recurrent aphthous ulcers (stomatitis).[37] This study supports our results because both the stomatitis and mucositis have a similar mechanism and expression in terms of inflammation. So using coconut oil in mucositis patients also has the same effects. There are some clinical studies which have proven the anti-gingivitis effects of coconut oil pulling. Recently in 2018, Kaliamoorthy et al. proved that coconut oil pulling is effective than sesame oil pulling for the reduction in severity of gingivitis.[38] Chalke et al in 2017 reported the use of coconut oil pulling as an adjunctive therapy for plaque-induced gingivitis.[39] Another study by Peedikayil was done in 2015 reported that coconut oil pulling could be used as an efficient supportive therapy in plaque induced gingivitis.[40] As we understand, these clinical trials have proven that coconut oil pulling is efficient in an inflammatory disease like gingivitis due to its anti inflammatory effects and possibly supporting its use as a treatment for the reduction of oral mucositis, being the fact that this is also an inflammatory process.

The main reason for the reduction in pain scores in our study could be due to the oil used for oil pulling that is coconut oil. Pain scores were reduced from baseline to the end of week 9 and suggest that there is no statistically significant difference in both the arms. This makes coconut oil equally as effective as magic mouthwash in chemo-radiation induced oral mucositis. This phenomenon could be supported by an animal model which showed that VCO decreased the release of inflammatory mediators like COX-2, TNF-α and IL-6 and the concentration of thiobarbituric acid reactive substance with an increase in antioxidant enzymes.[41] The second reason could be due to the presence of polyphenols in coconut oil[42] which possess various biological properties, including anti-nociceptive activities. The proliferative phase of chronic inflammation is suppressed by the anti-nociceptive effect of virgin coconut oil and throughout the process of inflammation; phagocytic cells release lysosomal enzymes which damage the surrounding cells. Gene expression, activation of pro-inflammatory transcription factors and signal transduction is also affected.[43] Presently, no such treatment exists that can completely resolve or prophylactically treat oral mucositis and is also devoid of any side effects. The major advantage behind the use of coconut oil for oil pulling therapy is due to its safety profile. In an animal toxicity study, an oral dose of 5000mg/kg coconut oil was found to be safe and well tolerated.[44] So, if the patient accidentally swallows the oil, which is an exception, it would not adversely affect the health

In the healing phase the use of coconut oil can be helpful in terms of increased wound healing properties. According to Ibrahim et al, an animal study confirmed a high angiogenic and wound healing property of fermented VCO in both in vitro and in vivo assays that might be mediated by the regulation of Vascular Endothelial Growth Factor signaling pathway.[45] Horas et al in 2017 showed that topical application of VCO accelerated palatoplasty wound healing showing an increased number of fibroblast cells appearing in the wound, in addition to fewer pain complaints.[46] This could be a factor which has also worked in our study population increasing the healing capacity in the coconut oil pulling group. Furthermore, in our study, except for mouth fatigue, all cases in the oil pulling group had fewer adverse effects when compared with the magic mouthwash. Fewer patients suffered from dehydration in the oil pulling group when compared with the magic mouthwash. This can be supported through a study done by Agero and Verallo-Rowell, in which they reported that coconut oil, is as effective and safe as mineral oil and can be used as a moisturizer for the treatment of xerosis. VCO showed effectivity through an increase in skin surface lipid levels and significantly enhanced skin hydration.[47] Due to this phenomenon, usage of coconut oil could be beneficial on a long term basis, even after the completion of chemo-radiation, where patients suffer from complete or partial xerostomia.

CONCLUSION

Oil pulling and magic mouthwash were similar in reducing both the severity of oral mucositis and relieving the pain of chemo radiation induced oral mucositis in head and neck cancer patients. Oil pulling with coconut oil can be used as an alternative therapy to magic mouthwash for treating chemo-radiation induced oral mucositis.

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CONFLICT OF INTEREST

None

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