EFFECT OF AN ESSENTIAL OIL MIXTURE ON RADIATION-ASSOCIATED ACUTE SKIN REACTIONS: A PILOT STUDY

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Acknowledgements

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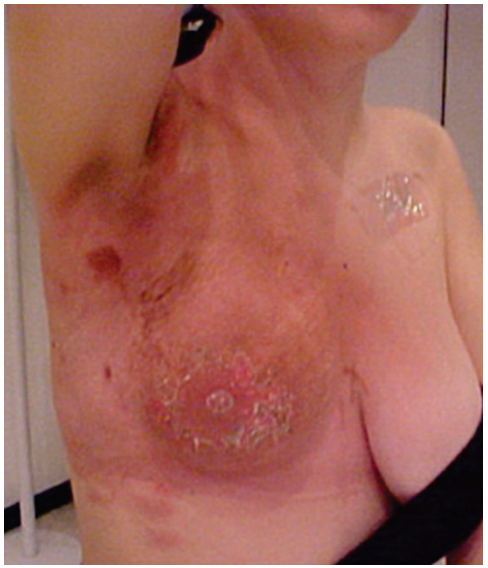
Background

- 230,480 new cases of invasive breast cancer (*American Cancer Society, 2011)*
- Surgery, followed by chemo and radiation typical
- Most women (87-96%) develop radiation-associated skin reactions within10-14 days, increasing in severity until treatment ends (*Fisher et al., 2000; Knobf & Sun, 2005; Porock & Kristjanson, 1999*)



Current Evidence:
Herbal Extracts/Oils

	Preparation	Significant Findings
Animal Models	Evening Primrose	• More pronounced proliferative cell activity with increased size of epidermis at 6 weeks
	Aloe Vera	• Accelerated cellular wound healing
Clinical Trials	Chamomile	• Reduced number & onset of grade 2 reactions (i.e., dark erythema)
	Calendula	• Lower incidence of moderate-severe dermatitis & pain
	Aloe vera	• Reduced incidence of moderate erythema in non-chemo patients • In cumulative doses >2700 cGy, longer median to adverse skin changes (5 vs. 3 wks)
	Wheatgrass	• Longer to peak skin toxicity (5 vs. 4.3 wks)

References: *Atiba et al. (2011); Heggie et al. (2002); Maiche et al. (1991); Morris et al. (1997); Olson et al. (2001); Pommier et al. (2004); Wheat et al. (2006)*

Specific Aims

AIM 1 - To evaluate if breast cancer patients receiving radiation who use essential oil blend (treatment) versus RadiaplexRx™ ointment (control) have significant differences in degree of skin reaction, pain intensity & quality of life (QOL)

AIM 2 - To estimate effect sizes and sample needed for larger trial

AIM 3 - To assess feasibility of this novel essential oil intervention for breast cancer patients receiving radiation

Methods

Design - Repeated-measures experimental design
Setting - Large Midwestern clinical cancer center
Sample - N=24

Inclusion Criteria	Exclusion Criteria
1. 18 years of age or older	1. Pregnant or lactating women
2. Able to read/speak English	2. Allergy/sensitivity to oil blend
3. Lumpectomy followed by radiation	

Instruments:

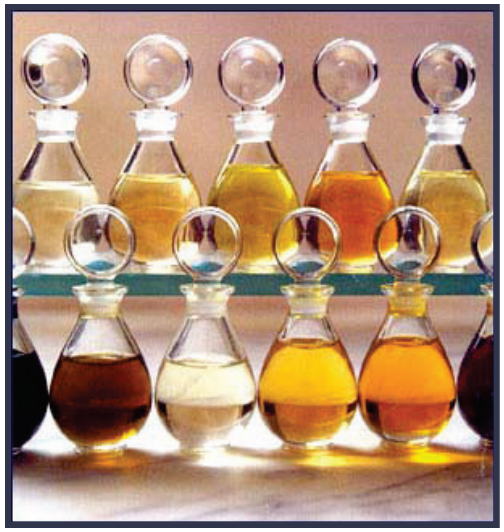
- **Acute skin toxicity grade** - *Weekly skin assessment*
- **Pain VAS** - *Weekly*
- **Quality of Life Index (QLI)-Cancer Version** & **EORTC** disease-specific items - *Baseline, 6 weeks, 10 weeks*
- **Patient satisfaction** - *3 weeks, 6 weeks*
- **Skin diary** – *Daily for 10 weeks*

Intervention

Experimental Group – Essential oil blend TID until follow-up

- *Helchrysum angustifolium* (Helichrysrum-2.5%)
- *Boswellia cateri* (Frankincense-5%)
- *Lavandula angustifolia* (Lavender-5%)
- *Pelargonium graveolens* (Geranium-5%)

Total concentration = 17.5%

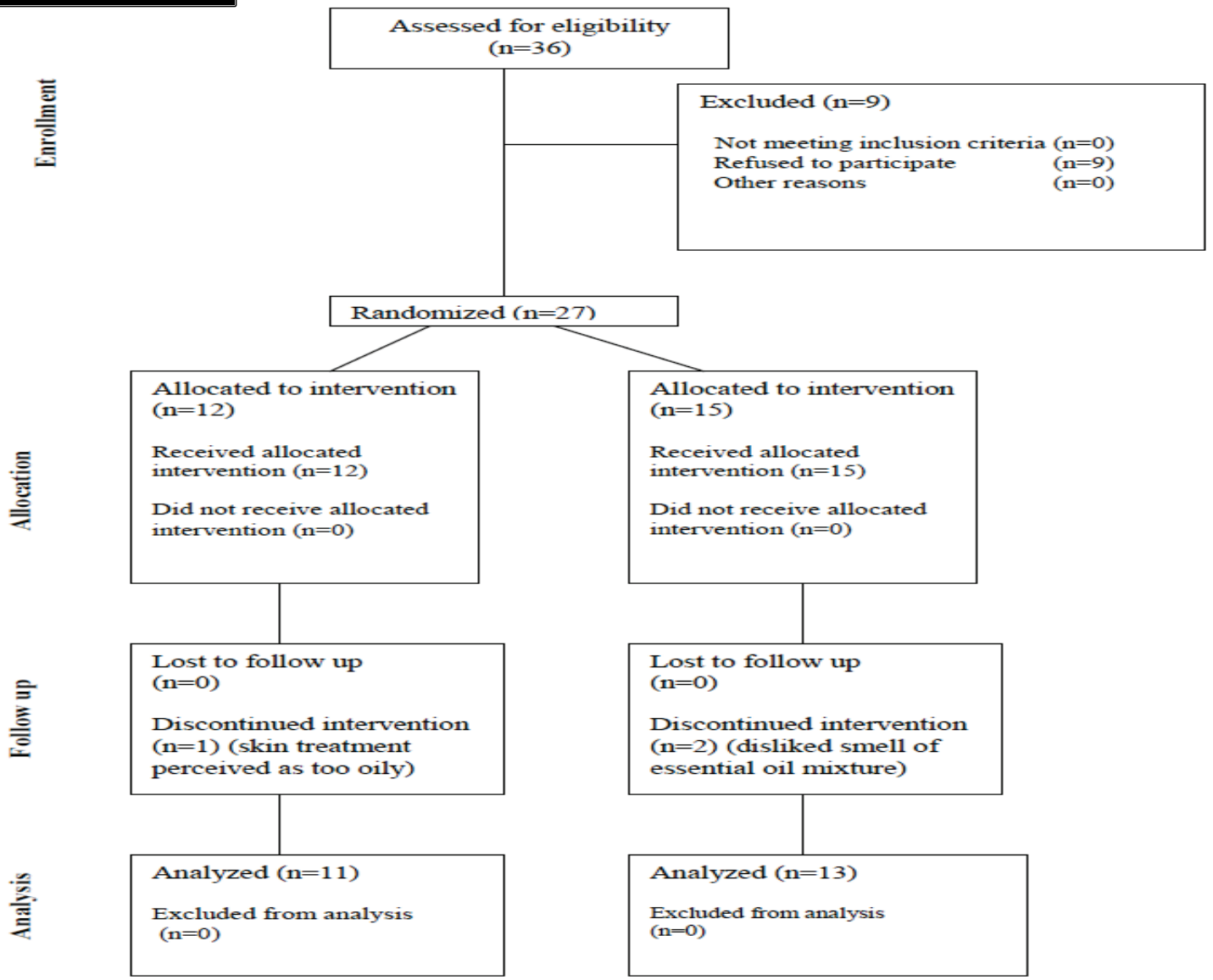


Oil mixture had carrier composition

- *Simmondsia chinensis* (Jojoba-32.5%)
- *Aloe babadenisis* (Aloe vera-30%)
- *Calophyllum* inophyllum (Tamanu-10%)
- *Oenothera biennis* (Evening Primrose-10%)

Control Group - RadiaPlexRx™ TID until 1-mo. follow-up

Consort Diagram



Description of Sample (N=24)

	Control (n=11)		Experimental (n=13)		*t-value*	*p-value*
	Mean	SD	Mean	SD		
Age	55.91	12.35	55.92	10.89	0.01	.99
Body mass index	28.41	8.48	29.36	5.12	0.34	.74
Pathak scale	2.55	0.82	2.39	0.77	0.50	.63
Baseline pain	4.80	4.78	19.39	27.96	1.85	**.09**
Total cumulative radiation dose	5545.50	438.75	5398.92	507.19	.72	.48

Descriptive Statistics:
*Skin, QOL, Patient Satisfaction**

	Control Group (n=11)						Experimental Group (n=13)					
	Baseline		Interim+		Follow-up++		Baseline		Interim+		Follow-up++	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Skin rating	0.14	0.20	0.73	0.29	1.65	0.60	0.28	0.31	0.73	0.41	1.38	0.65
QLI	4.95	0.65	4.91	0.75	5.06	0.62	5.18	0.64	5.19	0.85	5.31	0.58
Patient Satisfaction	NA	NA	4.42	0.75	3.76	1.36	NA	NA	4.09	1.20	3.98	0.94

+**Interim analyses**: 3 weeks – Skin rating & patient satisfaction; 6 weeks – QOL

++**Follow-up analyses**: 6 weeks – Skin rating & patient satisfaction; 10 weeks – QOL

*p>.05

AIM 1

Skin, QOL & Patient Satisfaction

	Interim Test Statistics				Follow-up Test Statistics			
	Est.	**SE**	***t-value***	***p-value***	**Est.**	**SE**	***t-value***	***p-value***
Skin rating	-0.04	0.16	-0.24	.81	-0.34	0.28	-1.21	.23
QLI	0.04	0.24	0.15	.88	0.09	0.24	0.40	.69
Patient Satisfaction	-0.21	0.47	-0.45	.64	0.30	0.53	0.57	.57

Interim Analyses based on:

- 3 Weeks - Skin
  Patient satisfaction
- 6 Weeks - QLI

Follow-Up Analyses based on:

- 6 Weeks – Skin
  Patient satisfaction
- 10 Weeks - QLI

AIM 1

*EORTC Disease-Specific QOL**

	Control Group (n=11)		Experimental Group (n=13)		*p-value*
	Mean	**SD**	**Mean**	**SD**	
Rash					
Week 6	2.67	1.32	1.90	0.88	.16
1 Mo. Follow-up	1.73	1.10	1.44	.53	.46
Dryness					
Week 6	2.00	1.00	2.30	1.16	.56
1 Mo. Follow-up	1.91	0.70	1.67	0.71	.45
Sweating					
Week 6	1.67	1.00	1.80	1.23	.80
1 Mo. Follow-up	1.82	0.98	1.78	0.97	.93
Painful skin					
Week 6	2.67	1.00	2.60	1.17	.90
1 Mo. Follow-up	1.78	0.67	1.78	0.67	.68
Skin ulcers					
Week 6	1.22	0.44	1.40	0.52	.43
1 Mo. Follow-up	1.09	0.30	1.22	0.67	.57

*European Organization for Research and Treatment of Cancer

AIM 2
Effect Sizes

	Interim Test Statistics					Follow-up Test Statistics				
	Est.	**SE**	***t-value***	***p-value***	**η^2**	**Est.**	**SE**	***t-value***	***p-value***	**η^2**
Skin rating	-0.04	0.16	-0.24	.81	.01	-0.34	0.28	-1.21	.23	.07
QLI	0.04	0.24	0.15	.88	.01	0.09	0.24	0.40	.69	.04
Patient Satisfaction	-0.21	0.47	-0.45	.64	.02	0.30	0.53	0.57	.57	.02

Interim Analyses based on:

- 3 Weeks - Skin
  Patient satisfaction
- 6 Weeks - QLI

Follow-Up Analyses based on:

- 6 Weeks – Skin
  Patient satisfaction
- 10 Weeks - QLI

AIM 3

Feasibility & Adherence

		Average Adherence+							Overall
		Week 1	*Week 2*	*Week 3*	*Week 4*	*Week 5*	*Week 6*	*Week 7*	
Control Group (n=11)	TID application	64%	64%	64%	60%	60%	71%	60%	**63%**
	Additional Topical Applications*	1	1	0	18	27	19	28	94
Experimental Group (n=13)	TID application	81%	55%	78%	78%	55%	45%	40%	**62%**
	Additional Topical Applications*	2	2	8	24	44	66	57	203

*Products ranged from: Ointments (analgesic, antibiotic, Benadryl, Cortisone, Silver Sulfadiazene), Emollients (Aquaphor, Aloe Vera), Silicone gel pads or Vigilon, to unspecified oils or products

+Chi-square analyses NS (p values=.19-.97)

Limitations

- Sample limited to English speaking patients
- Inability to blind essential oil mixture to reduce control over bias
- Smell associated with essential oil mixture
  (n=2 dropouts @ Week 1 and 3)

Recommendations

Intervention

- Manage expectations during consent about oil scent to improve adherence for greater long-term follow-up

- If possible – Blind smell of oils to minimize bias

Instruments

- Translate tools to allow non-English women to participate; assess acceptability and response

- Reduce subject burden by:
  - Electronic methods for daily recording of skin applications
  - Assess only disease-specific QOL items directly impacted by intervention

Conclusion

- While essential oil blend did not provide a better skin protectant effect, it was equivalent to standard of care (RadiaPlexRx™)
- These findings support botanical or non-pharmaceutical options for women
- Due to small effect sizes, pilot trials evaluating clinical effectiveness of other essential oil combinations are warranted

  Essential oils: German chamomile, Roman chamomile, Myrrh, Rose, Rosewood, Blue tansy or Yarrow

  Carrier oils: Gota kola, Calendula, Rosehip seed

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Questions