Patients use more topical medication when the medications come in a larger container

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Abstract

Introduction: Research shows that individuals consume more calories when provided with a larger portion size. It is unclear if similar behavior translates to topical medication use. The impact of container size and provider instructions on patient usage of topical medications has yet to be assessed.

Methods: Data was collected from 128 participants in an IRB randomized, controlled trial. To a marked 3cm×8cm rectangle on the forearm, patients applied petroleum jelly from either a large container or a small tube. Pre and post application container weights were measured.

Results: Patients applied more topical medication from the large container compared to the small tube.

Conclusion: Topical medication usage is influenced by the size of the container provided. It is beneficial to consider container size when prescribing topical medications and greater application is desired.

Keywords: adherence, topical treatment

Introduction

Topical medications are mainstay dermatology treatments and patients vary in the frequency and amount of topical medication they apply [1]. Although cost, potential side effects, and application instructions likely influence patient use, one overlooked consideration is container size. When provided larger sized meals, people often consume more calories [2]. It is unclear if similar behavior is seen with topical medication usage. Translation of this concept is a way to indirectly modulate how much topical medication is applied therapeutically. This study assessed whether container size or application instructions influenced the amount of topical medication patients applied.

Methods

This was an IRB-approved, single-blinded, randomized controlled trial. Eligible participants over the age of 18 without skin sensitivity to petroleum jelly or active skin lesions on either forearm were recruited from our dermatology clinics. Participants provided informed consent and completed a demographic questionnaire.

A 3cm×8cm rectangular area was then outlined on each forearm. Participants were randomized into two groups. Each group applied petroleum jelly from either a large (453g) container or a small (34g) tube to one forearm area and received application instructions to either "Apply petroleum jelly to the area" or "Apply a thin layer of petroleum jelly, just enough to cover the area". After petroleum jelly application, participants were presented with the other sized container and given identical application instructions for the second forearm. Sequential order of containers and instructions provided was randomized. Pre- and post-container weights were recorded using a scientific scale. Paired t-tests and

Table 1. Summary of baseline characteristics.

	Groups			
	"Apply petroleum jelly to the area"		"Apply a thin layer of petroleum jelly, just enough to cover the area"	
Variable	Small container first (n=32)	Large container first (n=32)	Small container first (n=32)	Large container first (n=32)
Age† – year	57.3±12.4	46.9±16.0	49.3±19.6	52.7±18.1
Female sex – no. (%)	19 (61.3%)	19 (65.5%)	18 (60.0%)	16 (61.6%)
Ethnicity** – no. (%)				
Caucasian	23 (74.2%)	26 (89.7%)	24 (80.0%)	23 (74.2%)
Black or African American	4 (12.9%)	2 (6.9%0	3 (10.0%)	7 (22.6%)
Other	4 (12.9%)	1 (3.5%)	3 (10.0%)	1 (3.2%)

**There were no significant differences between the group's baseline characteristics.*
†Values reported as mean±SD.
***Demographic information was collected on 121 subjects.*

analysis of variance were performed to determine factors influencing petroleum jelly application.

Results

A total of 128 individuals completed the study. Of the participants, 60% were female with an average age of 51 (**Table 1**).

There were no differences between randomized groups. Participants applied 55% more petroleum jelly when using large (453g) containers compared to the small (34g) tube (0.383g, 16.0mg/cm^2 versus 0.238g, 9.9 mg/cm^2 respectively, P<0.001). The order containers were provided and the application instructions given did not influence the amount of petroleum jelly applied. Moreover, there was no difference in the application amount related to gender, age (<50 versus >50), education level, or ethnicity (Table 2).

Discussion

Efficacy of topical medications is dependent on correct and sufficient application. Poor adherence to the use of topical medications is an obstacle to effective treatment. Recent reports suggest ideal topical medication application is 0.5mg/cm^2 for skin lesions. However, many patients do not meet this standard [3]. One study reports that 95% of patients fail to apply an adequate dosage for treatment with topical medication; this results in decreased efficacy of topical medications and compromise of treatment success [4]. Variation in container size of topical medications is an effective strategy to improve these application rates and thereby medication efficacy and adherence. The impact of the container size is further reinforced by our results which demonstrated no differences in topical medication usage with variations in application instructions or among different participant demographics.

Limitations: Limitations of the current study include the small sample size and the benign nature of petroleum jelly, which may have led to participants applying larger amounts than they would have with prescribed medications. Nonetheless, these results are encouraging for providers seeking to improve medication efficacy and application rates.

Conclusion

Patients apply more topical medication when provided with a larger container size. It is beneficial to consider container size when greater topical medication application is desired. This should lead to improved patient adherence and treatment success.

Potential conflicts of interest

Dr. Feldman has received research, speaking and/or consulting support from a variety of companies including Galderma, GSK/Stiefel, Almirall, Leo Pharma, Baxter, Boeringer Ingelheim, Mylan,

Celgene, Pfizer, Valeant, Taro, Abbvie, Cosmederm, Anacor, Astellas, Janssen, Lilly, Merck, Merz, Novartis, Regeneron, Sanofi, Novan, Parion, Qurient, National Biological Corporation, Caremark, Advance Medical, Sun Pharma, Suncare Research, Informa, UpToDate and National Psoriasis Foundation. He is founder and majority owner of www.DrScore.com and founder and part owner of Causa Research, a company dedicated to enhancing patients' adherence to treatment. Brittany Feaster, David Aung-Din, Edward Seger, Emily L. Unrue, and Abigail Cline have no conflicts of interest to report.

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Table 2. *Amounts of petroleum jelly used.*

	Small (34g) Container	Large (453g) Container	Difference in amount used between container sizes
Overall amount used (g)	0.238±0.187	0.383±0.363	0.145±0.326*
Male vs Female (g)	0.283 vs 0.227	0.340 vs 0.397	0.057 vs 0.170
Age (below 50 vs 50 and above, g)	0.227 vs 0.255	0.340 vs 0.425	0.113 vs 0.142
Randomization groups difference in amount used			
Application instructions	Small container first	Large container first	
"Apply petroleum jelly to the area"	0.108±0.340	0.218±0.397	
"Apply a thin layer of petroleum jelly, just enough to cover the area"	0.133±0.255	0.122±0.392	

**P<0.001. Values reported as mean±SD. For randomization groups, values reported are the average difference in amounts used between large and small containers ±SD. Statistical analysis performed using 2-tailed paired t-test for overall difference in weight used. 2-tailed unpaired t-test used for differences based on sex and age. ANOVA analysis performed for differences between randomization groups. In all instances, P<0.05 was considered statistically significant.*