

**Citation:**

Brown JM, Avens JS, Kendall PA, Hyatt DR, Stone MB. Survey of consumer attitudes and the effectiveness of hand cleansers in the home. *Food Protection Trends*. 2007. 27(8): 603-611.

**Study Design:**

Cross-Sectional Study, Before-and-After Study

**Class:**

D - [Click here](#) for explanation of classification scheme.

**Research Design and Implementation Rating:**

NEUTRAL: See Research Design and Implementation Criteria Checklist below.

**Research Purpose:**

- To determine public attitudes about available hand cleansers
- To determine the effectiveness of three hand cleansers in reducing bacteria on hands

**Inclusion Criteria:**

- Telephone survey: listed in a local Colorado telephone book
- Survey and experiment: student in a college-level food preparation class

**Exclusion Criteria:**

- None specified for the survey.
- For the experiment, participants didn't wash their hands before the experiment and didn't have cuts or abrasions on their hands

**Description of Study Protocol:****Recruitment**

- For the survey, phone numbers were selected at random from a local Colorado telephone book.
- For the paper survey and experiment, college students were asked to participate.

**Design: Cross-Sectional Study, Before-and-After Study**

- Survey: A six-question survey was developed at Colorado State University to develop and evaluate the attitude and behavioral base of consumers regarding hand cleansers.
- Experiment: Three hand cleansers were compared for ability to reduce bacteria: hand soap, antibacterial soap, and alcohol gel. Bacteria on hands was measured before and after using each cleansing agent using an agar plate containing a standard method plate count agar containing tryptone, yeast extract, and dextrose.

### **Blinding used (if applicable)**

Experiment: A masked coding system was used to identify treatments and was decoded after agar plates were evaluated on a 5-point scale by a single rater.

### **Intervention (if applicable):**

- Use of three hand cleansers

### **Statistical Analysis**

- Survey: Mean and percents for survey using Excel; SAS used to test for statistically significant differences between the study population for the telephone versus the paper surveys;
- Experiment: SAS was used to estimate least square means and evaluate differences between three hand cleansers.

## **Data Collection Summary:**

### **Timing of Measurements**

Survey completion represented one time measurements. For the experiment, measurements were made before and after handwashing.

### **Dependent Variables**

Experiment:

- Measurement of Relative Colony Number (RCN) before and after hand-washing

Survey:

- Effectiveness of hand cleansers

### **Independent Variables**

Experiment:

- Liquid Hand soap
- Antibacterial soap
- Alcohol gel

Survey:

- Consumer attitudes

### **Control Variables**

## **Description of Actual Data Sample:**

### **Initial N:**

- Telephone survey: 320 calls for 40 participants (12.5% response)
- Written survey: 60 students

- Experiment: 6 labs with 15 students each

**Attrition (final N):** none described

**Age:**

- Telephone survey: 33.5 +/- 30 years
- Paper survey: 22.5 +/- 6 years
- Experiment: college students

**Ethnicity:** not described

**Other relevant demographics:** not described

**Anthropometrics** not described

**Location:** Fort Collins, CO

## Summary of Results:

### Key findings:

- Most respondents believed that regular hand soaps were not as effective as antibacterial soaps in reducing bacteria on hands
- 64% reported using a hand cleanser with an antibacterial agent, and 62% would prefer to use antibacterial hand cleansers to remove bacteria from hands over alcohol or regular soap.
- All three hand cleansers reduced bacteria on hands when a 20 second hand wash procedure was used.
- Alcohol gel reduced relative colony numbers significantly more than either regular or antibacterial cleanser ( $P < 0.05$ ).
- There were no significant differences in post-hand wash relative colony numbers for regular and liquid antibacterial hand cleansers ( $P > 0.05$ ).

Variables	Regular liquid cleanser	Antibacterial soap	Alcohol gel	P
Mean reduction in RCN	0.4	0.7	1.4	<0.05

### Other Findings

- Survey: 76% participants in both surveys reported using liquid hand cleanser, 19% used bar, and 9% used alcohol gel.

## Author Conclusion:

The results of this study indicate that alcohol gel hand sanitizers are a quick and easy way to reduce microbial load on hands. However, when hands are soiled with debris, a simple 20-s hand wash with regular (non-antibacterial) hand soap, followed by application of an alcohol gel, may be unparalleled in preventing bacterial and viral infections transmitted by hands.

**Reviewer Comments:**

- *Though the relative colony numbers were similar in all groups pre-test, it was unclear how far apart the different hand soaps were administered and whether the order of administration was the same for all participants.*
- *Given each participant received all treatments, it would have been more powerful to do a within-person analysis.*
- *The participant characteristics are not described beyond age, so the generalizability of the results is somewhat unclear.*

*Authors note the following limitations:*

- *This study was limited by the low response rate to the community-based telephone survey*
- *Although contact or impression plate methods have been proven to be reliable and repeatable, the enumeration and quantification of such colony numbers are less efficient, and variations in smaller numbers of plates decrease reliability and limit the ability to detect smaller variations*

**Research Design and Implementation Criteria Checklist: Primary Research**

**Relevance Questions**

1.	Would implementing the studied intervention or procedure (if found successful) result in improved outcomes for the patients/clients/population group? (Not Applicable for some epidemiological studies)	Yes
2.	Did the authors study an outcome (dependent variable) or topic that the patients/clients/population group would care about?	Yes
3.	Is the focus of the intervention or procedure (independent variable) or topic of study a common issue of concern to nutrition or dietetics practice?	Yes
4.	Is the intervention or procedure feasible? (NA for some epidemiological studies)	Yes

**Validity Questions**

1.	<b>Was the research question clearly stated?</b>	Yes
1.1.	Was (were) the specific intervention(s) or procedure(s) [independent variable(s)] identified?	Yes
1.2.	Was (were) the outcome(s) [dependent variable(s)] clearly indicated?	Yes
1.3.	Were the target population and setting specified?	???
2.	<b>Was the selection of study subjects/patients free from bias?</b>	???

2.1.	Were inclusion/exclusion criteria specified (e.g., risk, point in disease progression, diagnostic or prognosis criteria), and with sufficient detail and without omitting criteria critical to the study?	Yes
2.2.	Were criteria applied equally to all study groups?	Yes
2.3.	Were health, demographics, and other characteristics of subjects described?	No
2.4.	Were the subjects/patients a representative sample of the relevant population?	???
<b>3.</b>	<b>Were study groups comparable?</b>	N/A
3.1.	Was the method of assigning subjects/patients to groups described and unbiased? (Method of randomization identified if RCT)	N/A
3.2.	Were distribution of disease status, prognostic factors, and other factors (e.g., demographics) similar across study groups at baseline?	N/A
3.3.	Were concurrent controls used? (Concurrent preferred over historical controls.)	N/A
3.4.	If cohort study or cross-sectional study, were groups comparable on important confounding factors and/or were preexisting differences accounted for by using appropriate adjustments in statistical analysis?	N/A
3.5.	If case control or cross-sectional study, were potential confounding factors comparable for cases and controls? (If case series or trial with subjects serving as own control, this criterion is not applicable. Criterion may not be applicable in some cross-sectional studies.)	N/A
3.6.	If diagnostic test, was there an independent blind comparison with an appropriate reference standard (e.g., "gold standard")?	N/A
<b>4.</b>	<b>Was method of handling withdrawals described?</b>	Yes
4.1.	Were follow-up methods described and the same for all groups?	Yes
4.2.	Was the number, characteristics of withdrawals (i.e., dropouts, lost to follow up, attrition rate) and/or response rate (cross-sectional studies) described for each group? (Follow up goal for a strong study is 80%.)	Yes
4.3.	Were all enrolled subjects/patients (in the original sample) accounted for?	???
4.4.	Were reasons for withdrawals similar across groups?	N/A
4.5.	If diagnostic test, was decision to perform reference test not dependent on results of test under study?	N/A
<b>5.</b>	<b>Was blinding used to prevent introduction of bias?</b>	Yes

5.1.	In intervention study, were subjects, clinicians/practitioners, and investigators blinded to treatment group, as appropriate?	???
5.2.	Were data collectors blinded for outcomes assessment? (If outcome is measured using an objective test, such as a lab value, this criterion is assumed to be met.)	Yes
5.3.	In cohort study or cross-sectional study, were measurements of outcomes and risk factors blinded?	N/A
5.4.	In case control study, was case definition explicit and case ascertainment not influenced by exposure status?	N/A
5.5.	In diagnostic study, were test results blinded to patient history and other test results?	N/A
<b>6.</b>	<b>Were intervention/therapeutic regimens/exposure factor or procedure and any comparison(s) described in detail? Were intervening factors described?</b>	???
6.1.	In RCT or other intervention trial, were protocols described for all regimens studied?	Yes
6.2.	In observational study, were interventions, study settings, and clinicians/provider described?	Yes
6.3.	Was the intensity and duration of the intervention or exposure factor sufficient to produce a meaningful effect?	???
6.4.	Was the amount of exposure and, if relevant, subject/patient compliance measured?	Yes
6.5.	Were co-interventions (e.g., ancillary treatments, other therapies) described?	N/A
6.6.	Were extra or unplanned treatments described?	N/A
6.7.	Was the information for 6.4, 6.5, and 6.6 assessed the same way for all groups?	N/A
6.8.	In diagnostic study, were details of test administration and replication sufficient?	N/A
<b>7.</b>	<b>Were outcomes clearly defined and the measurements valid and reliable?</b>	???
7.1.	Were primary and secondary endpoints described and relevant to the question?	Yes
7.2.	Were nutrition measures appropriate to question and outcomes of concern?	Yes
7.3.	Was the period of follow-up long enough for important outcome(s) to occur?	Yes
7.4.	Were the observations and measurements based on standard, valid, and reliable data collection instruments/tests/procedures?	???
7.5.	Was the measurement of effect at an appropriate level of precision?	???
7.6.	Were other factors accounted for (measured) that could affect outcomes?	Yes

7.7.	Were the measurements conducted consistently across groups?	N/A
<b>8.</b>	<b>Was the statistical analysis appropriate for the study design and type of outcome indicators?</b>	<b>Yes</b>
8.1.	Were statistical analyses adequately described and the results reported appropriately?	Yes
8.2.	Were correct statistical tests used and assumptions of test not violated?	Yes
8.3.	Were statistics reported with levels of significance and/or confidence intervals?	Yes
8.4.	Was "intent to treat" analysis of outcomes done (and as appropriate, was there an analysis of outcomes for those maximally exposed or a dose-response analysis)?	N/A
8.5.	Were adequate adjustments made for effects of confounding factors that might have affected the outcomes (e.g., multivariate analyses)?	N/A
8.6.	Was clinical significance as well as statistical significance reported?	Yes
8.7.	If negative findings, was a power calculation reported to address type 2 error?	N/A
<b>9.</b>	<b>Are conclusions supported by results with biases and limitations taken into consideration?</b>	<b>Yes</b>
9.1.	Is there a discussion of findings?	Yes
9.2.	Are biases and study limitations identified and discussed?	Yes
<b>10.</b>	<b>Is bias due to study's funding or sponsorship unlikely?</b>	<b>Yes</b>
10.1.	Were sources of funding and investigators' affiliations described?	Yes
10.2.	Was the study free from apparent conflict of interest?	Yes

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