
Young M Choi; Jashin J Wu, MD

ABSTRACT
Context: Medical journals have allowed researchers to share their latest discoveries, especially in the most common diseases affecting patients worldwide.
Objective: To analyze trends in the frequency of original research into common dermatologic diseases from 1970 to 2010.
Design: A retrospective review of the Journal of the American Academy of Dermatology and the Archives of Dermatology was performed using the MEDLINE database. All original research articles published between 1970 and 2010, by quinquennium, dealing with acne vulgaris, rosacea, skin cancer, dermatitis, psoriasis, or skin infections were included.
Main Outcome Measure: Total number of publications dealing with each dermatologic topic considered.
Results: The frequency of research into acne vulgaris and rosacea decreased from 24% in 1970 to 5.1% in 2010. Psoriasis research increased in frequency from 17.6% to 26.5% from 2000 to 2010, and skin cancer research increased from 4% in 1970 to 48% in 2010.
Conclusions: Topics that experienced early advancements in research, such as acne vulgaris and rosacea, demonstrated a decreasing trend in the frequency of publication. Published psoriasis research has increased in frequency since 2000, most likely because of the discovery of biologics. Finally, skin cancer research has continued to increase in frequency of publication, paralleling the increasing incidence of skin cancer.

INTRODUCTION
As described by Sharma and Sawhney in their review article, the last century has seen monumental advancements in the field of dermatology. The extraction of retinol from egg yolk in 1909 gave rise to topical and oral retinoids for the treatment of acne. Topical corticosteroids were discovered in 1935, providing anti-inflammatory activity for numerous skin diseases such as contact and atopic dermatitis. Modern-day heliotherapy began in 1923, leading to the US Food and Drug Administration’s approval of psoralen-ultraviolet A for psoriasis in 1982. Frederic Mohs, MD, introduced Mohs dermatosurgery in 1936, providing remarkable cure rates for basal cell and squamous cell carcinoma. Additionally, the development of antimicrobial agents over the years has provided successful treatment of numerous skin infections.

These and countless other advancements have been documented through publications in various medical journals devoted to dermatology. The first of these, the Journal of Cutaneous and Venereal Diseases (later known as the Archives of Dermatology and now as JAMA Dermatology), was first published in October 1882. Since then, dermatology journals have provided an opportunity for researchers to share their latest work in the field, a collaborative effort to ultimately bring forth the best medical care to patients. A recent study demonstrated trends in the type of original dermatology research published in these journals, but little is known about how the subject matter of research has changed over time.

The purpose of our study was to determine trends in the frequency of original research into common dermatologic diseases published in two foremost American dermatology journals, the Journal of the American Academy of Dermatology (JAAD) and Archives of Dermatology, by analyzing the years 1970 to 2010 by quinquennium.

METHODS
We conducted a search of the MEDLINE database, extracting print versions of all articles published in JAAD and Archives of Dermatology for the calendar years of 1970, 1975, 1980, 1985, 1990, 1995, 2000, 2005, and 2010. There were no articles from JAAD in 1970 and 1975 because the first publication of JAAD was in 1979. Only articles meeting one of the specified subject matter criteria and considered to be original research were included in the study. Original research articles were identified as having a clearly stated objective, well-defined methods, and a results section.

Table 1. Number of original dermatologic research articles by quinquennium, 1970-2010

<table>
<thead>
<tr>
<th>Year</th>
<th>Number of articles</th>
</tr>
</thead>
<tbody>
<tr>
<td>1970</td>
<td>25</td>
</tr>
<tr>
<td>1975</td>
<td>29</td>
</tr>
<tr>
<td>1980</td>
<td>33</td>
</tr>
<tr>
<td>1985</td>
<td>51</td>
</tr>
<tr>
<td>1990</td>
<td>100</td>
</tr>
<tr>
<td>1995</td>
<td>76</td>
</tr>
<tr>
<td>2000</td>
<td>85</td>
</tr>
<tr>
<td>2005</td>
<td>123</td>
</tr>
<tr>
<td>2010</td>
<td>98</td>
</tr>
</tbody>
</table>

Young M Choi is a Clinical Research Fellow in Dermatology at the Los Angeles Medical Center in CA and a Fourth Year Medical Student at the David Geffen School of Medicine at the University of California, Los Angeles. E-mail: mikechoi@mednet.ucla.edu. Jashin J Wu, MD, is the Director of Dermatology Research for the Department of Dermatology at the Los Angeles Medical Center in CA. E-mail: jashin.j.wu@kp.org.
The study type (eg, clinical trial, basic science, retrospective, cross-sectional) was not a discriminating factor for inclusion in the study. Case reports, review articles, meta-analyses, editorials, and educational materials were excluded.

The subject matter criteria for this study were based on the most commonly encountered outpatient dermatologic diagnoses\(^6\): acne vulgaris/rosacea, skin cancer, dermatitis, psoriasis, and skin infections. Acne vulgaris and rosacea were classified together because of their similarity as acneiform disorders. For skin cancer, only the three most common types were considered: basal cell carcinoma, squamous cell carcinoma, and melanoma. A classification of dermatitis was assigned for studies addressing atopic dermatitis, contact dermatitis, or seborrheic dermatitis. Psoriasis was also one of the included subject matters. Finally, a classification of skin infections was assigned for studies addressing viral, bacterial, fungal, or parasitic infections of the skin, hair, nails, or mucous membranes. Examples included herpes simplex, varicella, human papillomavirus, molluscum contagiosum, cellulitis, abscesses, Lyme disease, syphilis, dermatophytosis, tinea versicolor, scabies, and lice. If an article dealt with more than one possible subject matter, the topic that best fit the primary objective of the article was chosen.

RESULTS

Original Research Articles

The study included 620 published original research articles dealing with at least one of the aforementioned topics. There was a relatively linear increase in the number of original research articles from 1970 to 2010. In both JAAD and Archives of Dermatology, the peak number of original research articles occurred in 2005, which produced 123 articles (Table 1). Moreover, both JAAD and Archives of Dermatology saw the largest percentage increase in original articles between 1985 and 1990—109% and 74% increases, respectively.

Trends in Subject Matter

The subject matter that composed the largest proportion of the collected articles was skin cancer (36.5%), followed by psoriasis (23.7%), skin infections (18.2%), dermatitis (15%), and acne/roacea (6.6%). In JAAD, acne/roacea was the most frequent topic at 38.5% in 1980, followed by a precipitous decline to 1.9% in 1995 and leveling to approximately 7.5% in 2010. Skin cancer consisted of 30.8% of articles in 1980, with a gradual increase in the past decade to 40.5% in 2005 and to 35.8% in 2010. Dermatitis showed a gradual decrease from 23.1% in 1980 to 19.2% in 1995 and 15.1% in 2010. Psoriasis peaked at 40.6% in 1985, with a sharp decline to 14.9% in 1990, but increased back to 23.4% in 2000 and 30.2% in 2010. Skin infections trended upward from 1980, peaking at 32.8% in 1990, followed by a relatively linear decline to 11.3% in 2010 (Figure 1).

In Archives of Dermatology, acne/roacea consisted of 24% of articles in 1970, declining to around 5% to 7% from 1975 to 2005, reaching 2.2% in 2010. Skin cancer represented the smallest proportion of articles in 1970 at 4% but witnessed a continued rise to 35% in 1980, 47.4% in 2000, and 62.2% in 2010. Dermatitis remained relatively stable throughout the years, starting at 12% in 1970, peaking at 18.4% in 2000, and returning to 11.1% in 2010. Psoriasis was the most prevalent of the topics considered in 1970 at 32% but
began to decrease in 1985, reaching a low of 10.5% in 2000. Recent years, however, have shown an increase back to 18.4% in 2005 and 22.2% in 2010. Skin infections demonstrated a bimodal trend, decreasing from 28% in 1970 to 10% in 1980. This was followed by a peak of 50.3% in 1990 and a subsequent decline to 2.2% in 2010 (Figure 2). When articles from JAAD and Archives of Dermatology were combined and analyzed together, acne/roacea declined from 24% in 1970 to 4% in 1990 and 5.1% in 2010. Skin cancer demonstrated an increasing trend from 4% in 1970 to 31% in 1990 and 48% in 2010. Dermatitis showed a small increase from 12% in 1970 but roughly remained at 15% to 17% throughout the past 3 decades. Psoriasis showed much variability from 1970 to 1990 but demonstrated a recent increase from 17.6% in 2000 to 19.5% in 2005 and 26.5% in 2010. Finally, skin infections demonstrated a continuous decline from a peak of 32% in 1990 to 20% in 2000 and 7.1% in 2010 (Figure 3).

DISCUSSION

A critical component of modern medicine has been the publication of research in medical journals, allowing investigators to share their latest discoveries with the world. In dermatology, some of the most commonly encountered diseases are acne vulgaris, rosacea, skin cancer, dermatitis, psoriasis, and skin infections.\(^1\) By studying trends in the prevalence of original research into these subject matters, we attempted to provide a historical perspective as well as a commentary on the future direction of research in the field.

We found that original research publications into the most common dermatologic topics have grown steadily since 1970, which is not surprising because dermatology has continued to grow as a medical specialty. Interestingly, both JAAD and Archives of Dermatology demonstrated a similar period of rapid growth in original research, around 1985 to 1990, as well as a peak in the number of publications around 2005. This may coincide with findings that the compounded annual growth rate of biomedical research funding peaked around 1990, followed by a steady decline since then. This correlates with the fact that the “golden era” of discovering new classes of antibiotics ceased in the 1970s, followed by a resurgence of interest in the 1990s as a result of emerging antibiotic resistance.\(^16,17\)

Epidemiologic studies have shown that psoriasis is an increasingly common disease, which has almost doubled in annual incidence since the 1970s.\(^18\) We found that the prevalence of psoriasis research initially showed a variable course, with an eventual downward trend around 1990, but has seen a steady increase since 2000. This may be largely attributable to the development of tumor necrosis factor inhibitor therapy around this time, which has proved to be very successful in the treatment of psoriasis.\(^19-21\) We foresee a continued increase in research with biologics, as well as further investigation into cardiovascular comorbidities.\(^22\)

Another interesting finding in our study was that research into skin cancer has continuously increased over time, even in the past decade. We believe this has been driven in large part by advances in melanoma research. As mentioned in the report from the third Melanoma (Research) Bridge meeting.

Nevertheless, recent studies on genetic variations between Propionibacterium acnes strains,\(^11\) a potential bacteriophage-based treatment for acne,\(^12\) and the continual search for a microbial cause of rosacea offer an exciting future for research in these topics.\(^13\)

Research into dermatitis has stayed relatively stable since 1970, especially in recent years. Although contact dermatitis and seborrheic dermatitis were included in this category, atopic dermatitis has been the main topic of research. A possible explanation for this steady trend includes the relatively recent insights into the pathogenesis of the disease, fueled by joint interest and research from allergy and immunology.\(^14\) Moreover, a 2006 study by Asher et al\(^15\) showed that the worldwide prevalence of eczema was increasing, especially in developing nations. Regarding skin infections, we found that original research peaked around 1970 and 1990, followed by a steady decline since then. This correlates with the fact that the “golden era” of discovering new classes of antibiotics ceased in the 1970s, followed by a resurgence of interest in the 1990s as a result of emerging antibiotic resistance.\(^16,17\)

The Permanente Journal/ Winter 2015/ Volume 19 No. 1
in December 2012, a “new era” of targeted and immune-based therapies for melanoma has been ushered in by recent findings.

Moreover, the National Cancer Institute has increased funding for melanoma research in recent years from $102.3 million in 2010 to $121.2 million in 2012. Continued research into skin cancer is critical, as studies have shown an increase in the incidence of melanoma and nonmelanoma skin cancers.

We acknowledge limitations in our study. Access to journal articles was limited by our university’s subscriptions. Certain articles that addressed multiple topics were categorized under one topic, considered the best fit by the reviewer. However, this occurred rather infrequently. We also analyzed trends in research based on one year of research for every five years. This may not have been representative of the timeframe because of sampling error. In addition, there were no publications in JAAD in the years 1970 and 1975, so analysis during this period was limited to Archives of Dermatology.

CONCLUSIONS

We have demonstrated trends in the frequency of original research into common dermatologic topics, with an attempt to explain some of our findings in a historical context. We have discovered that dermatology research has paralleled clinical needs, a testament to the ability of modern medicine to continually answer the call for innovation. We believe our findings bring further optimism to an already bright future for research in dermatology.

Disclosure Statement

Dr Wu received research funding from Abbott Laboratories, Abbott Park, IL; AbbVie, North Chicago, IL; Arogen Inc, Thousand Oaks, CA; Eli Lilly, Indianapolis, IN; Merck, Whitehouse Station, NJ; and Pfizer, New York, NY, which were not directly related to this study. Mr Choi has no conflicts of interest to disclose. No funding was received for this study.

Acknowledgment

Kathleen Louden, ELS, of Louden Health Communications provided editorial assistance.