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INVESTIGATIVE REPORT

Knowledge and Influence of Predatory Journals in Dermatology: A Pan-Austrian Survey

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The aim of this study was to assess the knowledge and influence of predatory journals in the field of dermatology in Austria. A total of 286 physicians (50.5% men) completed a questionnaire. The vast majority of subjects read scientific articles ($n = 281$, 98.3%) and took them into consideration in their clinical decision-making ($n = 271$, 98.5% of participants that regularly read scientific literature). Open access was known by 161 (56.3%), predatory journals by 84 (29.4%), and the Beall's list by 19 physicians (6.7%). A total of 117 participants (40.9%) had been challenged by patients with results from the scientific literature, including 9 predatory papers. Participants who knew of predatory journals had a higher level of education as well as scientific experience, and were more familiar with the open-access system ($p < 0.001$). These results indicate that the majority of dermatologists are not familiar with predatory journals. This is particularly the case for physicians in training and in the early stages of their career.

Key words: predatory journal; survey; physician; dermatologist; knowledge; influence.

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SIGNIFICANCE

Predatory journals are an emerging problem within the scientific community, but knowledge of these journals and their influence on dermatology, have not been investigated. Most dermatologists are not aware of predatory journals, but scientifically active and older physicians are more likely to know of predatory journals. Some physicians have been confronted by patients with predatory literature, thus it is necessary to educate doctors about this issue.

There has been a continuous increase in papers published every year since the 1950s (1). Publishing has changed over the last decade due to easier access to the World Wide Web, which enables rapid distribution of information. Over the same period, large mainstream publishers of subscription-based journals began publishing articles in electronic format on the internet (2, 3). This occurred in reaction to the establishment of the open-access (OA) movement in the 2000s (2). The open-access model is characterized by journals that make their articles widely available by distributing them online. Furthermore, in contrast to subscription-based journals, open-access articles are freely available to research institutions and any kind of readership. Authors have to pay a publication fee, known as article processing charges (APC), to publish their work. An advantage of open-access journals is, however, that the time from submission to publication is generally shorter than for traditional journals; this guarantees more rapid publication, and, since it is freely available to all readers, also guarantees broader visibility (4).

However, with the increase in open-access journals, and the growing tendency of publishing articles online only, an increasing number of publishers and journals are exploiting the open-access model by corrupting the peer-review process with the goal of increasing the number of published articles and thus profiting from publication fees (5). This problematic issue has been addressed by Jeffrey Beall, a librarian at the University of Colorado, who created a list of journals and publishers with suspicious publishing ethics. Since most of these journals were interested only in increasing their revenue, he named them "predatory journals" and "predatory publishers" (6). Given this background, this study aimed to investigate whether physicians had knowledge of predatory journals and how this influenced their daily practice routines. A survey was developed, and a pan-Austrian questionnaire-based study conducted in all dermatological departments and among all registered dermatologists.

MATERIALS AND METHODS

Dermatologists of all educational levels were eligible to participate in this prospective pan-Austrian survey. The study consisted

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of a paper-based survey of dermatologists located in hospitals and an online survey of dermatologists in private practice. The online survey was established with LimeSurvey GmbH (Hamburg, Germany) for all registered dermatologists and the link was distributed via email by the head of each professional group or an equal representative of each of the 9 federal states. In this online survey, each questionnaire item had to be answered in order to proceed to the next question. The survey was online from 18 July to 31 October 2017. Two email reminders, in mid-August and mid-September, were sent in order to increase the response rate. No further actions were taken to contact study participants. For the paper-backed survey, one representative was appointed for each of the 14 Austrian departments of dermatology, and a paper version of the questionnaire was distributed to the hospital staff by the representatives. Anonymously completed questionnaires were collected at the departments and returned collectively to the study team, where the data were merged with the data from the online survey. Responses were numbered and entered into an Excel spreadsheet in a pseudonymized fashion (Microsoft, Redmond, WA, USA). The survey contained of 16 main questions and 14 sub-questions, which were included only if the appropriate main question was checked/answered. The full survey is shown in Appendix S1[1].

A list of all registered physicians working in the field of dermatology was obtained from a publicly available list of the Austrian Chamber of Physicians and used for estimating response rate.

The study was reviewed and approved by the local ethics committee of the Medical University of Graz (ID: 29-510 ex 16/17).

Statistical analysis

Participant age, the only continuous parameter, was normally distributed and is therefore summarized as mean and standard deviation (SD). All other parameters are summarized as absolute and relative frequencies. Missing responses from the paper version of the questionnaire are not explicitly stated, but can be determined from the total numbers; they are excluded from further statistical analyses.

Differences between participants with and without knowledge of predatory journals, as well as between participants who had or had not been confronted by patients with scientific literature, were assessed by *t*-test (age), Mann–Whitney *U* test (ordinal parameters) or Fisher's exact test (all other nominal parameters). A 2-sided alpha level of 0.05 was considered significant. All statistical analyses were conducted with R version 3.4.2 and SPSS version 22 (SPSS, Chicago, IL, USA).

RESULTS

The questionnaire was made available to 839 dermatologists, of whom 286 (34.1%) participated in this study; 175 of the 362 (48.3%) dermatologists working in a hospital and 111 of the 477 (23.3%) outpatient dermatologists participated. Of these, 144 (50.5%) were men and 141 (49.5%) women. The mean ± SD age of all participants was 45.2 ± 10.8 years, participating men being slightly older than women (47.5 ± 10.7 vs. 43.0 ± 10.5 years). Sixty-nine residents (24.2%), 97 board-certified dermatologists (34.0%), 66 consultants (23.2%), 24 lecturers (8.4%) and 29 full professors (10.2%) completed the questionnaire (for detailed descriptive statistics see **Tables I** and **II**). A total of 127 (44.4%) participants stated that they received regular invitations from journals to submit articles. The majority ($n=97$, 78.2%) received 1–10 invitations per week, whereas 25 (20.2%) received 11–50, 0 (0.0%) received 51–100, and 2 (1.6%) received more than 100 invitations per week.

Answers to the most important questionnaire items according to the participants' position are shown in **Fig. 1**.

Knowledge of predatory journals

Eighty-four participants (29.4%) had prior knowledge of predatory journals; this information came from scientific literature ($n=31$, 36.9%), friends/colleagues ($n=37$, 44.0%), emails ($n=26$, 31.0%), congresses ($n=16$, 19.0%) and media (including social media) ($n=19$, 22.6%) (The knowledge of predatory journals among different sub-specialities can be found in **Fig. 2**A). Thirty-four (11.9%) participants knew how to identify predatory journals and 252 (88.1%) did not.

No statistically significant difference was found between the 2 groups regarding sex ($p=0.245$) or main workplace ($p=0.100$). Participants with knowledge of predatory journals did not read scientific literature or include scientific literature in their daily practice more often than participants without such knowledge ($p=0.326$ and $p=0.324$). However, participants who were aware of predatory journals: (*i*) had significantly more often contributed actively to scientific literature ($p<0.001$), (*ii*) were scientifically active at the time of the survey ($p<0.001$), (*iii*) knew the open-access publishing system ($p<0.001$), and (*iv*) were aware of Beall's list (7) ($p<0.001$).

Furthermore, they had a higher number of published papers ($p<0.001$), had more often been listed as corresponding authors ($p=0.002$), and more frequently authored high-impact publications ($p=0.003$).

Influence of scientific literature on daily practice and the importance of predatory journals

In total, 117 (40.9%) of the participating dermatologists had been confronted with scientific literature by patients. Nine (7.9%) participants, 5 hospital dermatologists, and 4 working in a private practice stated that the paper came from a predatory journal, whereas 33 (28.9%) said the presented literature was non-predatory, and the majority of participants confronted with literature ($n=72$, 63.2%) could not categorize the papers due to lack of knowledge. Most commonly, physicians treating sexually transmitted diseases (STD) and cutaneous malignancies were confronted with scientific literature (STD: $n=11/15$, 73.3%; dermato-oncology: $n=33/47$, 70.2%) (see Fig. 2B).

Participants confronted with published medical results worked in hospitals more often than those that were not ($p=0.013$), held higher positions ($p<0.001$), and were more likely to be male ($p=0.022$). Finally, participants

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Table I. Demographic characteristics of the whole study cohort as well as separately for participants without and with knowledge of predatory journals

		Knowledge of predatory journals		
	All participants ($n = 286$)	No ($n = 202$)	Yes ($n = 84$)	p-value
Age, years mean ± SD	45.2 ± 10.8	44.6 ± 10.5	46.8 ± 11.4	0.138
Sex, *n* (%)				0.245
Female	141 (49.5)	104 (51.7)	37 (44.0)	
Male	144 (50.5)	97 (48.3)	47 (56.0)	
Position, *n* (%)				**< 0.001**
Resident	69 (24.2)	55 (27.4)	14 (16.7)	
Specialist registrar	97 (34.0)	79 (39.3)	18 (21.4)	
Consultant	66 (23.2)	44 (21.9)	22 (26.2)	
Lecturer	24 (8.4)	13 (6.5)	11 (13.1)	
Professor	29 (10.2)	10 (5.0)	19 (22.6)	
Working place, *n* (%)				0.100
University hospital	88 (30.8)	55 (27.2)	33 (39.3)	
Hospital	87 (30.4)	62 (30.7)	25 (29.8)	
Registered dermatologist	111 (38.8)	85 (42.1)	26 (31.0)	
Residents in working area, *n* (%)				0.161
< 1,000	1 (0.3)	1 (0.5)	0 (0.0)	
1,000–< 5,000	1 (0.3)	1 (0.5)	0 (0.0)	
5,000–< 50,000	60 (21.0)	45 (22.3)	15 (17.9)	
50,000–200,000	98 (34.3)	71 (35.1)	27 (32.1)	
> 200,000	126 (44.1)	84 (41.6)	42 (50.0)	
Are you scientifically active? *n* (%)				**< 0.001**
No	187 (67.0)	148 (74.7)	39 (48.1)	
Yes	92 (33.0)	50 (25.3)	42 (51.9)	
Do you read scientific literature? *n* (%)				0.326
No	5 (1.7)	5 (2.5)	0 (0.0)	
Yes	281 (98.3)	197 (97.5)	84 (100)	
If yes, do you include scientific literature in your therapeutic/diagnostic decisions?* (n=275/281), *n* (%)				0.324
No	4 (1.5)	4 (2.1)	0 (0.0)	
Yes	271 (98.5)	190 (97.9)	81 (100)	
Do you have scientific experience? *n* (%)				**< 0.001**
No	92 (32.2)	81 (40.1)	11 (13.1)	
Yes	194 (67.8)	121 (59.9)	73 (86.9)	
If you have scientific experience, number of publications* (n=192/194), *n* (%)				**< 0.001**
< 10	113 (58.3)	81 (68.1)	32 (43.8)	
11–100	65 (33.9)	34 (28.6)	31 (42.5)	
> 100	14 (7.3)	4 (3.4)	10 (13.7)	
If you have scientific experience, did you author any high impact publications?* (n=180/194), *n* (%)				**0.003**
No	88 (48.9)	65 (57.5)	23 (34.3)	
Yes	92 (51.1)	48 (42.5)	44 (65.7)	
If you have scientific experience, have you been listed as corresponding author?* (n=188/194), *n* (%)				**0.002**
No	70 (37.2)	54 (45.8)	16 (22.9)	
Yes	118 (62.8)	64 (54.2)	54 (77.1)	
If yes, how often have you been listed as corresponding author?* (n=116/118), *n* (%)				0.233
1–10	77 (66.4)	44 (69.8)	33 (62.3)	
11–20	18 (15.5)	11 (17.5)	7 (13.2)	
21–50	13 (11.2)	6 (9.5)	7 (13.2)	
>50	8 (6.9)	2 (3.2)	6 (11.3)	
Do you know the term "open-access"? *n* (%)				**< 0.001**
No	125 (43.7)	119 (58.9)	6 (7.1)	
Yes	161 (56.3)	83 (41.1)	78 (92.9)	
If yes, have you published anything in an open-access journal?* (n=157/161), *n* (%)				0.154
No	111 (70.7)	59 (71.1)	52 (70.3)	
Yes	36 (22.9)	17 (20.5)	19 (25.7)	
Don't know	5 (3.2)	2 (2.4)	3 (4.1)	
Did not publish anything	5 (3.2)	5 (6.0)	0 (0.0)	
Do you know of Beall's list? *n* (%)				**< 0.001**
No	266 (93.3)	202 (100)	64 (77.1)	
Yes	19 (6.7)	0 (0.0)	19 (22.9)	
Do you look at the review metrics (date submitted/revised/accepted) of a published article? *n* (%)				**< 0.001**
No	125 (43.9)	106 (52.7)	19 (22.6)	
Yes	160 (56.1)	95 (47.3)	65 (77.4)	

*Follow-up question, total number of answers out of all possible are given in parentheses. Missing values are not shown explicitly, but are the difference from the given total number. Percentages have been calculated from all valid given answers.

Table II. Answers to selected questionnaire items of the whole study cohort divided by the participants not challenged and challenged by patients with scientific literature

	Challenged by patients with scientific literature		
	No ($n=169$)	Yes ($n=117$)	p-value
Age, years, mean±SD	44.7±11.3	46.0±10.0	0.345
Sex, *n* (%)			**0.022**
Female	93 (55.4)	48 (41.0)	
Male	75 (44.6)	69 (59.0)	
Position, *n* (%)			**<0.001**
Resident	49 (29.2)	20 (17.1)	
Specialist registrar	66 (39.3)	31 (26.5)	
Consultant	34 (20.2)	32 (27.4)	
Lecturer	9 (5.4)	15 (12.8)	
Professor	10 (6.0)	19 (16.2)	
Working place, *n* (%)			**0.037**
University hospital	47 (27.8)	41 (35.0)	
Hospital	46 (27.2)	41 (35.0)	
Registered dermatologist	76 (45.0)	35 (29.9)	
Residents in working area, *n* (%)			0.145
<1,000	0 (0.0)	1 (0.9)	
1,000–<5,000	0 (0.0)	1 (0.9)	
5,000–<50,000	44 (26.0)	16 (13.7)	
50,000–200,000	54 (32.0)	44 (37.6)	
>200,000	71 (42.0)	55 (47.0)	
Are you scientifically active? *n* (%)			**0.003**
No	123 (74.1)	64 (56.6)	
Yes	43 (25.9)	49 (43.4)	

Missing values are not shown explicitly, but are the difference to the given total number. Percentages have been calculated from all valid given answers.

with knowledge of predatory journals have been challenged by patients with scientific literature more often than those without such knowledge ($p<0.001$).

DISCUSSION

With the increase in open-access publishing and the growing tendency to publish articles online only, there was an increasing number of publishers and journals exploiting the open-access model by corrupting the peer-review process, with the sole aim of increasing their journal revenue (5, 8).

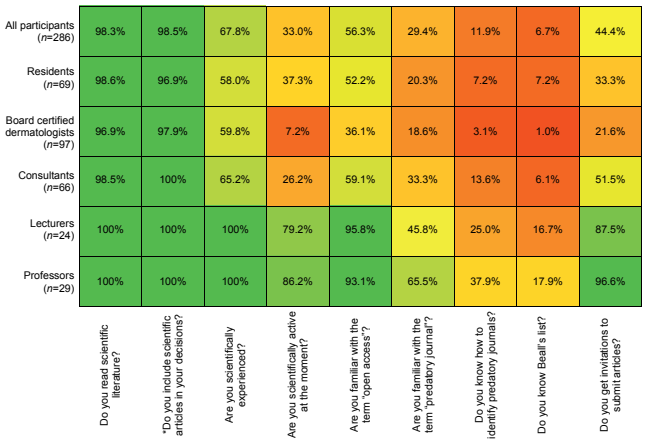

Fig. 1. Answers to selected questionnaire items given by all participants, as well as divided by position held. One participant did not disclose their speciality. *Only relevant if participants read scientific literature ($n=281$, follow-up question).

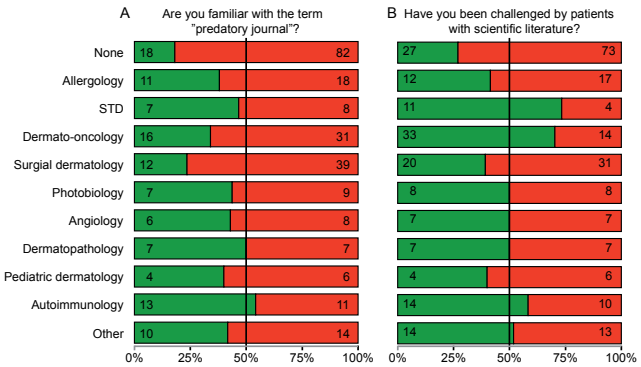

Fig. 2. (A) Knowledge of predatory journals, and (B) confrontation with scientific literature by patients among different sub-specialities. Dermatologists familiar with the term (A) "predatory journals" or (B) being challenged by patients with scientific literature are presented as *green* bars, others as *red*. The total number of answers given is stated in *black* numbers in each category.

Due to their goal of extracting money from authors, Jeffrey Beall, an academic librarian at the University of Colorado in Denver, described them as predatory journals/publishers (9).

He created a blacklist of predatory journals, which has been criticized by many publishers, which was published on his blog "Scholarly Open Access" (initially hosted by https://scholarlyoa.com, but currently cached on https://beallslist.weebly.com) and which has been used widely in the academic community (9, 10).

Based on our pan-Austrian survey, we were able to identify 2 major findings: firstly, that the majority of doctors are not aware of predatory journals and, secondly, that predatory journals have already made their way into daily clinical practice.

These results also demonstrate a direct association between knowledge of the open-access movement, predatory journals and Beall's list, respectively. Not surprisingly, knowledge of predatory journals was higher in participants with scientific experience and higher medical training. However, despite the fact that nearly every participant stated that they read scientific literature to keep them up to date, reading scientific literature did not increase the likelihood of being aware of predatory journals. Also, not surprisingly, the number of publications was a good predictor of being aware of predatory journals.

In particular, doctors in the early stages of their careers who want to contribute actively to scientific knowledge appear to be at higher risk of submitting their work to predatory journals due to lack of knowledge and experience in publishing (11). Therefore, scientists with a higher level of experience, who tend to have better knowledge of predatory journals, should be aware of the situation of young researchers' and guide them accordingly. In addition, authors should be aware that being listed as a co-author on a paper published in a predatory journal might harm their reputation (12).

Another important issue addressed in this survey was the question of patients challenging their doctors with scientific literature. It is important that doctors stay informed on the latest medical developments in order to provide up-to-date care for their patients. However, it has become increasingly difficult to keep up with the information provided, due to the ever-increasing number of published articles per year (1). In line with the growing number of published articles per year, the number of predatory journals/publishing also increases constantly (7). The main problem of predatory journals from a clinical perspective is that they do not provide a thorough peer-review and that, therefore, data presented in predatory journals cannot be trusted (13). Since there is no quality control performed in predatory journals authors can also hide potential conflicts of interest. In addition, predatory journals could be used by authors to support their theses and influence the scientific community or patients, especially in highly controversial fields (14). It is important to know that predatory journals often use prestigious origins to foster their credibility. For example, The American Journal of Medical and Dental Sciences is published from Pakistan rather than from the USA (13). Given this background, physicians challenged with scientific literature by patients should be very cautious.

Furthermore, younger colleagues should seek advice from older, more scientifically experienced, colleagues in order to escape the predatory mechanism. Finally, potential authors should check carefully which services journals offer, and if they are listed in internationally recognized important databases (PubMed, Web of Science, or others). This is of importance, since such databases also have scientific standards that have to be met by the journal in order to be listed (including properly conducted peer-review).

Study limitations

Major limitations of this study are that the survey was conducted in only one European country, within only one speciality, and the response rate was low.

Conclusion

Two conclusions can be drawn from the survey results. First, older, more scientifically experienced physicians should guide younger colleagues and raise awareness of predatory publishing. Secondly, since more and more open-access journals are emerging, patients continuously challenge physicians in daily practice with scientific literature. However, they should critically review the origins of these results, since predatory journals might be used to influence doctors' decisions.

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