Minireview

Ethnic diversity in German dermatology textbooks: Does it exist and is it important? A mini review

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Introduction

Clinical dermatology is a medical specialty that relies heavily on visual perception. The initial steps involved in diagnosis are generally carried out by visually assessing the patient, e.g., to distinguish between inflammatory diseases and proliferative or pigmentary lesions. Recently published research has revealed a discrepancy in the quality of dermatology clinical care of white people and people of color (PoC), in both the UK and the US [1, 2]. A major contributing factor may be that medical and dermatologic specialist training mostly uses white and fair skin types as the standard reference, while neglecting darker skin types. Thus, physicians train their eyes to best detect erythema or erythroderma in white skin. Failing to identify severe acute dermatoses, e.g., drug reactions or Kawasaki’s syndrome, in darker skin types may lead to fatal misjudgments of the untrained doctor. This concept of ethnic bias in the training of physicians is also demonstrated in the field of scientific research, as it too focuses heavily on white and fair skin types [1–4].

The movement of human beings on a global scale has increased dramatically in previous decades, largely due to factors such as tourism, international business and trade, and migration, especially on the part of those seeking refuge and asylum. As such, physicians in Western countries are confronted with an ever-increasing diversity of skin types and ethnicities [5]. The previously mentioned publications point out that the current medical training in Western countries no longer meets the medical needs of a significant part of the patient population. Indeed, this shortcoming has sometimes been viewed as an act of racial discrimination since it may result in a lower standard of care for PoC [1].

One potential tool in confronting this failure of modern medical practice is via the application of alternative techniques for describing skin color, such as Fitzpatrick’s functional approach, which does not associate skin type with any particular ethnic or cultural region. This is in contrast to other frameworks where skin color definitions are treated in this manner, e.g., the terms “Caucasian” and “non-Caucasian” being associated with fair or darker skin, respectively. Fitzpatrick’s alternative approach, therefore, allows for a range of tones to be applied to each ethnicity, depicting the wide diversity of human skin pigmentation in a more authentic manner [6]. This is especially relevant for Germany, since its population is becoming increasingly internationalized and subsequently German physicians are being confronted with a more diverse array of skin colors [5, 7, 8].

The aim of this systematic mini review is to assess how skin diversity is currently presented in standard German textbooks and thus what knowledge of skin diseases in different pigmented skin can currently be expected by physicians, both in general medical and specialist dermatology training.

Summary

Recently published research has detected discrepancies in medical care as a result of skin color in Anglo-American countries. This was partly attributed to the fact that medical and dermatological specialist training textbooks were found to consist of examples and material that could be classified as more than 90 % white and fair skin (Fitzpatrick’s skin types I–III), including pictures in textbooks and scientific literature used as standard reference works. This systematic review reveals similar findings for German dermatological textbooks and consequently gives rise to the question of whether current medical training and practice in Germany adequately meets the needs of a population that is becoming ever more diverse.
**Methods**

For this study, 17 dermatological textbooks, published by German authors in the German language over the past four years, were analyzed. Particular attention was placed on assessing the quantity of images displaying skin diseases and the diversity of said skin in demonstrating the different Fitzpatrick skin types.

Books were identified via a search carried out on the 4th of December 2020, of the databases: “DNB” (German National Library, see online supplementary file 1) and “THULB Jena” (Library of the University of Jena, see online supplementary file 1) with the query “Dermatologie” (dermatology). The field of search was further narrowed to include only textbooks, as well as the terms “books”, “German language” and was restricted to publishing years 2016–2020. Furthermore, only medical textbooks and reference books that are composed primarily of images showing the epidermis were included. After removing duplicates, earlier editions and books not meeting our inclusion criteria, 17 textbooks remained and were subsequently analyzed (online supplementary files 2 and 3).

The books were systematically analyzed page by page. Images showing skin were summarized for each book and stratified into one of six Fitzpatrick’s skin types. It should be noted that the perceived color of the skin in individual photographs can be influenced by a variety of factors, such as: the lighting while taking the photograph, the printing process, the paper quality and the lighting of a room while observing a picture. To reduce such environmental differences as much as possible and further standardize the analysis, all books were assessed on the same desk, all eBooks on the same desktop. All computer research took place in the same office room with overhead lighting. As a visual reference, we used the “color bar survey item” by Ho & Robinson [9].

If an image consisted of multiple pictures it was counted as one if a single skin type was present. If multiple skin types were identified, we divided the image by the number of photographs and added the proportion to the different skin type. In this way, the results contain point numbers.

In addition, two major textbooks [10, 11] and a dermatologic pediatric textbook [12] were assessed chapter by chapter to determine the diversity of the visual references of the most common dermatoses such as acneiforme dermatoses, atopic dermatitis and eczema, psoriasiform dermatoses and psoriasis, proliferative lesions and melanoma.

We additionally analyzed two US atlases [13, 14], one German atlas [15], one textbook [16] and one chapter of a major German dermatology textbook [17] dealing explicitly with skin of color as a comparable reference and alternative towards the German textbook analysis (see online supplementary file 4).

As a guideline for this review, we followed the PRISMA statement [18]. This mini review was not registered nor submitted to an ethics committee.

**Results**

After review of the aforementioned DNB and THULB databases, we were able to identify 182 and 167 findings on each platform respectively. Among these results, 146 from the DNB and 140 from the THULB could subsequently be excluded since they failed to meet the primary criteria set out for this study. Furthermore, it was found that 22 of the results were duplicates and thus could also be omitted. Of the remaining 41 findings, it was decided to exclude an additional 24 as they did not meet a secondary set of criteria decided upon for this research project (see online supplementary file 1).

This process of elimination left 17 textbooks that were subsequently included in this study, containing a total of 5,354 pictures showing Fitzpatrick skin type I to IV. Among these, 4,892.11 images were identified to belong to skin type I and II, representing 91.40 % of the images. Furthermore, skin type III was seen in 344.10 pictures (6.43 %), skin type IV in 51.33 (0.96 %), skin type V in 23.5 (0.44 %) and skin type VI in but a single picture (0.02 %).

The proportion of all observed skin types that were classified outside the categories of I and II added up to a total 7.84 %, and the darker skin types from IV to VI amounted to only 1.41 % (Table 1).

Looking at the major textbooks (1) “Braun Falco’s Dermatologie, Venerologie und Allergologie” [10] and (2) “Dermatologie, Venerologie” [11] and the (3) Pediatric dermatology atlas [12], all published in 2018, the chapters containing acne showed (1) 6.25 %, (2) 1.45 % and (3) 5.41 % skin type III and no skin types IV to VI; the ones presenting atopic dermatitis (1) 5 % and (3) 1.56 % skin type III, (2) showed no skin type III as well as no skin types IV to VI; the ones showing psoriasis (1) 13.04 %, (2) 3.85 % and (3) 6.25 % for skin type III and no skin types IV to VI. The chapters presenting melanoma showed (1) 36.36 %, (2) 5.36 and (3) 10 % skin type III and only in (2) 1.09 % for skin types IV to VI was shown (Table 2).

As for the alternative atlases “Dermatology Atlas for Skin of Color” [14] presented from 417 images 405 (97 %) skin type III to VI and 345 (82.73 %) skin types IV to VI (type I and II 12 images [2.88 %], type III 60 images [14.39 %], type IV 211 images [50.60 %], type V 132 images [31.65 %], type VI with 2 images [0.48 %]); the “Dermatological Atlas of Black Skin” [13] showed from a total of 109 images 100 % skin type III to VI and also IV to VI. No images of skin types I to III were included (type I to III 0, 17 images with skin type IV [15.60 %], type V 92 images [84.40 %] and 9 images of skin type VI [2.89 %]); “Dermatosen aus
Table 1 German Dermatology textbook’s visual content of Fitzpatrick’s skin types.

| Author, Year | Title | Number of pages [total] | Images showing Fitzpatrick’s skin types |
|--------------|-------|-------------------------|----------------------------------------|
|              |       | I to VI | III to VI | IV to VI |
|              |       | Total [n] | [n] | [%] | [n] | [%] |
| Dirschka, Oster-Schmidt, Schmitz, 2020 | Klinikleitfaden Dermatologie | 848 | 211 | 1 | 0.47 | 0 | 0 |
| Herrmann, Trinkkeller, 2020 | Dermatologie und medizinische Kosmetik: Leitfäden für die kosmetische Praxis | 286 | 76 | 2 | 2.63 | 0 | 0 |
| Kahl-Scholz, 2020 | Du studierst doch Medizin, sag mal ...: Alltagsbeschwerden einfach erklärt ... | 170 | 17 | 0 | 0 | 0 | 0 |
| Kaufmann, Podda, 2020 | Dermatologische Operationen: Farbatlas und Lehrbuch der Hautchirurgie | 392 | 299 | 6 | 2.01 | 0 | 0 |
| Stebut-Borschitz et al., 2020 | Facharztprüfung Dermatologie und Venerologie: 1000 kommentierte Prüfungsfragen | 370 | 116 | 1 | 0.86 | 0 | 0 |
| Plötz, 2019 | Häufige Hauttumoren in der Praxis | 153 | 210 | 20 | 9.52 | 0 | 0 |
| Terhorst, 2019 | BASICS Dermatologie | 158 | 206 | 13 | 6.31 | 5 | 2.43 |
| Blume-Peytavi, Albrecht-Nebe, 2018 | Atlas der pädiatrischen Dermatologie | 633 | 1249 | 78 | 6.25 | 5 | 0.40 |
| Fritsch, Schwarz, 2018 | Dermatologie Venerologie: Grundlagen, Klinik, Atlas | 1217 | 555 | 14 | 2.52 | 3 | 0.54 |
| Kautz, 2018 | Energie für die Haut: Wirkungen und Nebenwirkungen von Lasern, Blitzlampen und weiteren Energieträgern | 501 | 101.99 | 17.24 | 16.90 | 4 | 3.92 |
| Keil, Kiecker, 2018 | Endspurt Klinik. Skript 11: Urologie, Dermatologie | 80 | 55 | 0.5 | 0.91 | 0 | 0 |
| Plewig, Ruzicka, Kaufmann et al., 2018 | Braun-Falco’s Dermatologie, Venerologie und Allergologie | 2265 | 1224.75 | 199.5 | 16.29 | 51.5 | 420 |
| Sterry, 2018 | Kurzlehrbuch Dermatologie | 351 | 202.90 | 15.93 | 7.85 | 2 | 0.99 |
| Stolz, 2018 | Bildgebende Diagnostik in der Dermatologie: Dermatoskopie, Sonografie, optische Kohärenztomografie, konfokale Lasermikroskopie und weitere physikalische Verfahren | 304 | 298 | 5 | 1.68 | 0 | 0 |

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Images showing Fitzpatrick’s skin types

| Total [n] | I to VI | III to VI | IV to VI |
|-----------|---------|-----------|---------|
| 323       | 224.167 | 99        | 94      |
| 246.5     | 199     | 96        | 95      |
| 91        | 31      | 20        | 40      |

Table 3

Table 1 Continued.

drei Kontinenten” [15] presented from 323 images 224.167 (69.40 %) skin type III to VI and 176.167 (54.54 %) skin types IV to VI (type I and II with 99 images [30.60 %], type III 48 images [14.86 %], type IV 72.5 images [22.44 %], type V 94 images [29.20 %], type VI with 9 images and 2.89 %); of the 246.5 images in the textbook “Ethnic Skin. Medical and Surgical” [16] 231.5 (93.91 %) presented with skin type III to VI and 185.5 (75.25 %) skin types IV to VI (type I and II with 15 images [6.08 %], type III 46 images [18.66 %], type IV 90 images [36.51 %], type V 95.1667 images [38.61 %], type VI with 0.333 images and 0.14 %); and the chapter 89 of “Braun Falco’s Dermatologie, Venerologie und Allergologie” “Besonderheiten der nichtweißen Haut” [17] the distribution of skin types showed the following: 14 images showing skin, of which twelve (85.71 %) presented skin type III to VI and nine (64.29 %) skin types IV to VI (type I and II with 2 images [14.28 %], type III three images [21.43 %], type IV 6 images [42.86 %], type V three images [21.43 %] and no images showing type VI) (Table 3).

Discussion

Our results agree with similar studies and analyses conducted for textbooks published in the US and the UK [1, 2]. They show a clear under-representation of Fitzpatrick skin types III to VI in current German dermatological reference literature. Indeed, the skin types IV to VI are all but absent.

This poses the question to what extent German dermatologists are currently trained using literature that only informs them on treating white people. The German specialization training curriculum, including both the “WBO” ([Muster-] Weiterbildungsordnung) and the state-level curriculum of the “WBO of Thuringia” both make the claim that their objective is to impart sufficient skills in diagnostics and treatment so as to allow physicians to effectively treat their prospective patients [19, 20]. However, no recognizable emphasis is placed on training practitioners and dermatologists in treating individuals with pigmentation levels that have traditionally been less commonly represented in German society.

To our knowledge, only the “International Society for Dermatology in the Tropics” has incorporated dermatoses of different skin types and pigmentation levels into its curriculum for the certificate “Tropical Dermatology”. Furthermore, it is the only German association that required holistic medical training in terms of skin types that have a higher degree of pigmentation relative to fair skin types. From 2013–2018 approximately 85 medical professionals became certified in “Tropical Dermatology”, which can be viewed as a relatively small number when compared to the 5,000 dermatologists currently practicing in outpatient healthcare in Germany [5, 21].
Table 2 Diversity of images in German Dermatology textbooks: A focus on common dermatoses (acne/acneiform diseases, atopic dermatitis and eczema, psoriasis/psoriasiforme dermatoses, proliferative lesions/melanoma).

| Author, Title, Year | Title of chapter containing: | Images showing Fitzpatrick's skin types |
|---------------------|--------------------------------|-----------------------------------------|
|                     | – acne/acneiform diseases     | I to VI | III to VI | IV to VI |
|                     | – atopic Dermatitis and eczema| [n]     | [n] [%]   | [n] [%]   |
|                     | – psoriasis/psoriasiforme dermatoses |       |           |          |
|                     | – melanoma/proliferative lesions |       |           |          |
| Plewig, Braun-Falco's Dermatologie, Venerologie und Allergologie, 2018 | 72 Akne und Rosazea | 17 | 1 | 6.25 | 0 | 0 |
|                     | 32 Atopisches Ekzem           | 21 | 1 | 5.00 | 0 | 0 |
|                     | 39 Psoriasis                  | 26 | 3 | 13.04 | 0 | 0 |
|                     | 106 Melanom                   | 15 | 4 | 36.36 | 0 | 0 |
| Fritsch, Schwarz Dermatologie Venerologie: Grundlagen, Klinik, Atlas, 2018 | 18 Gewebs- und regionsspezifische Krankheiten der Haut | 60 | 1 | 1.45 | 0 | 0 |
|                     | 5 Intoleranzreaktionen (including eczematous dermatoses) | 48 | 0 | 0 | 0 | 0 |
|                     | 8 Erythematosquamous/hyperkeratotische Hautkrankheiten | 20 | 1 | 3.85 | 0 | 0 |
|                     | 17 Neoplasien (Tumoren) und tumorähnliche Läsionen der Haut | 98 | 5 | 5.36 | 1 | 1.09 |
| Blume-Peytavi, Albrecht-Nebe Atlas der pädiatrischen Dermatologie, 2018 | 23 Talg- und Schweißdrüsenerkrankungen | 37 | 2 | 5.41 | 0 | 0 |
|                     | 15 Ekzeme und Dermatitiden    | 64 | 1 | 1.56 | 0 | 0 |
|                     | 16 Erythematose, erythematosquamous und papulöse Dermatosen | 64 | 4 | 6.25 | 0 | 0 |
|                     | 4. Hauttumoren und Tumorsyndrome | 50 | 5 | 10 | 0 | 0 |
**Table 3** Diversity of images in selected textbooks and a textbook chapter dealing with diversely pigmented skin.

| Author, Year | Title of book or chapter | Number of pages [total] | Images showing Fitzpatrick’s skin types |
|--------------|---------------------------|-------------------------|----------------------------------------|
|              |                           |                         | I to VI [n] [%]                        | III to VI [n] [%] | IV to VI [n] [%] |
| Jackson-Richards, Pandya, 2014 | Dermatology Atlas for Skin of Color | 321 | 417 [97.12] | 345 [82.73] |
| Conolly, Bikowski, 2006 | Dermatological Atlas of Black Skin | 96 | 109 [100] | 109 [100] |
| Schmeller, Bendick, Stingl, 2005 | Dermatosen aus drei Kontinenten. Bildatlas der vergleichenden Dermatologie | 230 | 323 | 224.167 [69.40] | 176.167 [54.54] |
| Johnson, Moy, White 1998 | Ethnic Skin. Medical and Surgical | 290 | 246.5 | 231.5 [93.91] | 185.5 [75.25] |
| Bendick, 2018 in Braun Falco's Dermatologie, Allergologie und Venerologie | 89 Besonderheiten der nichtweißen Haut | 16 | 14 | 12 [85.71] | 9 [64.29] |

**Images showing Fitzpatrick’s skin types**

| Author, Year | Title of book or chapter | I + II [n] [%] | III [n] [%] | IV [n] [%] | V [n] [%] | VI [n] [%] |
|--------------|---------------------------|----------------|-------------|-------------|-----------|------------|
| Jackson-Richards, Pandya, 2014 | Dermatology Atlas for Skin of Color | 12 [2.88] | 60 [14.39] | 211 [50.60] | 132 [31.65] | 2 [0.48] |
| Conolly, Bikowski, 2006 | Dermatological Atlas of Black Skin | 0 [0] | 0 [0] | 17 [15.60] | 92 [84.40] | 0 [0] |
| Schmeller, Bendick, Stingl, 2005 | Dermatosen aus drei Kontinenten. Bildatlas der vergleichenden Dermatologie | 99 [30.60] | 48 [14.86] | 72.5 [22.44] | 94 [29.20] | 9 [2.89] |
| Johnson, Moy, White 1998 | Ethnic Skin. Medical and Surgical | 15 [6.08] | 46 [18.66] | 90 [36.51] | 95.167 [38.61] | 0.333 [0.14] |
| Bendick, 2018 in Braun Falco's Dermatologie, Allergologie und Venerologie | 89 Besonderheiten der nichtweißen Haut | 2 [14.28] | 3 [21.43] | 6 [42.86] | 3 [21.43] | 0 [0] |
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While the major German Dermatology congresses “DDG-Tagung” and “Fortbildungswoche” include seminars on various topics with regard to the “International Society for Dermatology in the Tropics” curriculum and in addition to the fact that physicians can obtain certification in “Tropical Dermatology” via a voluntarily course, there is no ongoing education for dermatoses in different skin types currently being offered in German standard medical and specialist training. This is not withstanding the fact that individual doctors may have attained a higher degree of experience and standard of care in all skin types due to their own self-motivation and interest in doing so. Nevertheless, it can generally be expected that PoC will receive a reduced standard of medical care in Germany based on the color of their skin. Diversity has so far only been discussed in terms of female to male ratio when, for the first time in DDG history, a female dermatologist was elected head in 2017 [22]. Nevertheless, in the latest edition of the German textbook “Braun-Falco’s Dermatologie, Venerologie und Allergologie” [10] we find one chapter dealing especially with skin of color which, to our knowledge represents the only current contribution to the subject in a German textbook. Others rather contain chapters with pigmentation abnormalities than physiological differences of basic pigmentation [11, 23–25]. The only German textbook solely dedicated towards comparison of different skin types is [Dermatosen aus drei Kontinenten], published in 2005. Looking at the visual content of this textbook and the above mentioned chapter reveal a rather equally levelled content of different skin types in comparison to our German textbook analysis of the past four years (Table 3). As is seen in the US American atlases [13, 14] and the book on ethnic skin [16] a predominance of skin type IV and V is shown as intended (Table 3). The clearly detected imbalance of diversity towards skin types IV to VI in German dermatology textbooks gives rise to the question, whether the diversification of our books is an admissible mean to diversify our specialist training and general dermatological education. Given that common dermatoses such as eczema and psoriasis may present with a significant different clinical presentation in darker skin types whilst they occur with similar frequency worldwide, ethically it is inevitable to develop a “clinical view” for those dermatoses [26] on all skin types. Given also the visual approach of the dermatological diagnostics adapting our visual references in this manner seems like a fitting first approach. The comparison atlas “Dermatosen aus drei Kontinenten” presents a well-balanced example for future textbooks. On the other hand, we should not miss the fact, that certain findings of typical clinical presentations are best seen on fair skin, e.g. erythema in its own very diversity is best to assess on lighter skin types, justifying hence the predominance of fair skin in visual reference material in certain fields of systematically developed dermatological curricula.

The assessment of the actual need for more training in dermatology of darker skin types is favorable but problematic since predominant skin types remain “traditionally” type I to III. The quantification of PoC (or fairer skin types) in the German population is not possible with current methods of measurement since DESTATIS counts the German population by other parameters than skin type, e.g. income, education or age. In 2019 approximately 26 % of Germany’s population was considered as having a migrant background. Of the 21.1 million people 65 % were counted as being of any other European nationality (EU and non-EU countries), 4.6 % were from African nations, 3 % from the American continents and 22 % were from Asia with Turkey alone making up 13 % of the total migrant figure [27]. To estimate the rate of darker skin types can be attempted on the basis of the immigration rate but is widely counterproductive because it can easily appear as an act of racial profiling. Since DESTATIS considers all persons without German citizenship as well as German citizens with at least one parent without German citizenship to have a migrant background, there is no distinction in the above-mentioned figures with regard to skin type. In 2019 alone, the migrant population in Germany increased by 2.1 % and this was one of the lowest annual increases in the last decade. Therefore, an ever-increasing skin diversity is to be expected nationwide [7], and consequently there will inevitably be changes in the social, medical and cultural needs of the German population [27], requiring general dermatology training to be responsive of these changes.

Conclusions

This review has shown the under-representation of darker skin types in German dermatological education. Standard references in textbooks for specialists as well as in general medical education are predominantly tailored to the fairer skin types of I to III. A potential consequence of this may be a reduced quality of medical care for PoC, which would fail to meet the standards of medical care that are expected in Germany. With the increasing diversity of skin types in our population we should meet this development by adapting educational strategies which integrate skin diversity during general medical and specialist training in scientific literature, textbooks and conferences. Likewise, major publishing houses are recommended to respect these changes by advising their authors to include a broader spectrum of skin types into their future manuscripts. The atlas “Dermatosen aus drei Kontinenten” gives a fitting stimulation for potential future publications and textbooks.
Limitations

Despite our efforts to exclude discrepancies in the visual perception of color, judgement with regard to stratification of skin types may be altered by the author’s perception as well as the office and desktop lighting standards. Interindividual judgement may also be present when differentiating one skin type from another.

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