The epidemiology of skin conditions in the aged: A systematic review

Elisabeth Hahnel*, Andrea Lichterfeld, Ulrike Blume-Peytavi, Jan Kottner

Charité-Universitätsmedizin Berlin, Department of Dermatology and Allergy, Clinical Research Center for Hair and Skin Science, Charitéplatz 1, 10117 Berlin, Germany

A R T I C L E   I N F O

A B S T R A C T

Background: The human population is aging. A systematic summary of the epidemiology of skin diseases in the aged is lacking.

Methods: A systematic review was conducted including electronic database searches in MEDLINE, Embase, SCOPUS and Web of Science. The eligibility criteria were primary incidence and prevalence studies or secondary data analysis, English or German language, subjects being 65+ years and reported skin problems or diseases. Data extraction was conducted using a standardized data collection form and the methodological quality of included studies was assessed.

Results: After screening of 1491 records, 74 records were included reporting data for more than 20 skin conditions. The majority of prevalence and incidence figures was identified for hospital and long-term care settings. The most prevalent skin diseases were fungal infections (14.3%—64%), dermatitis (1% —58.7%), xerosis (5.4%—85.5%) and benign skin tumors (1.7%—74.5%). Additionally, pressure ulcer prevalence ranged from 0.3% to 46% and incidence from 0.8% to 34%.

Conclusion: Skin conditions and diseases in aged populations are frequent. Health care practitioners should pay attention to those, although skin conditions might not be the primary reason for seeking care. Epidemiological data are lacking especially for home care and community settings although this can be regarded as the most important from a public health and prevention point of view. The methodological quality and reporting of epidemiological studies in the aged populations must be improved.

Systematic review registration number: CRD42014014553 (PROSPERO).

1. Introduction

Demographic changes cause a worldwide growing and aging of the human population. Today, nearly 11.5% of the world population are aged over 60 years. This proportion will grow up to 22% in 2050 [1].

Due to age-related changes in skin structure and function, aged populations are vulnerable to develop cutaneous problems and diseases [2—4]. This increased susceptibility is caused by the skin aging processes itself, systemic and chronic diseases, e.g. diabetes mellitus [5], medications [4], functional limitations and personal habits [6]. In recent years, the importance of age-related dermatoses gained increasing attention in dermatology and related disciplines [7,8]. Often undiagnosed but highly prevalent conditions like xerosis cutis, inflammation and fungal infections decrease the quality of life and increase the risk for secondary infections [3,9,10]. Chronic wounds like venous or pressure ulcers cause pain, limit mobility and social activity, and are associated with negative emotional and social impacts [11,12]. The increased vulnerability of the skin in the geriatric population is an upcoming health issue in the context of demographic changes, the increasing number of multi-morbid patients and the complexity of care.

From an epidemiological perspective prevalence and incidence measures are useful to indicate disease 'loads' and risks in certain populations [13]. However, a systematic summary and critical appraisal of the available epidemiological evidence about the skin conditions in aged populations is lacking. Using the data of the latest Global Burden of Disease Study 2010 epidemiological estimates of the disease burden of fifteen common categories of skin conditions were selected and reported per gender, age groups and geographic regions [14]. This report clearly indicates that the rate of years lost due to disability due to skin conditions is highest in the aged. However, reported estimates were obtained from systematic reviews and

* Corresponding author.
E-mail addresses: Elisabeth.Hahnel@charite.de (E. Hahnel), Andrea.Lichterfeld@charite.de (A. Lichterfeld), Ulrike.Blume-Peytavi@charite.de (U. Blume-Peytavi), Jan.Kottner@charite.de (J. Kottner).

were based on statistical models. Among others, primary studies with sample sizes less than 100 and specific groups were excluded. The search was not especially focused on aged populations and details about different healthcare settings were unavailable.

The objective of this systematic review was to identify, summarize and evaluate the prevalence and incidence of skin conditions in aged individuals being 65 years and older.

2. Methods

The protocol for this systematic review was previously registered at the PROSPERO database (Registration number: CRD42014014553) [15].

2.1. Search strategy

The electronic databases MEDLINE and Embase were systematically searched via OvidSP. The comprehensive search was separated in four sections: (1) Pressure ulcer, (2) Incontinence-associated dermatitis, (3) Dry skin conditions, (4) Other skin diseases. Reference lists of included full texts were screened and forward searches in Web of Science and Scopus for additional literature were conducted. The detailed search strategy of this systematic review is shown in the review protocol [15].

2.2. Eligibility criteria

The eligibility criteria were primary incidence and prevalence studies or secondary data analysis published from January 2000 to September 2014, availability of abstracts and full texts, English or German language, subjects being 65+ years and reported skin problems or diseases. Secondary data analysis were defined as analysis of data which was collected for another purpose than estimating prevalence or incidence (e.g. hospital statistics). Publications in which the lower age limit was not clearly stated were included only, if the reported mean age minus two standard deviations was higher than 60 years.

2.3. Study selection

After removing duplicates, the results of database searches were imported into a reference manager (EndNote X7) and screened by two independent reviewers (EH, AL). References not meeting the inclusion criteria were excluded. Any discrepancies were discussed and resolved by a third reviewer (JK). The remaining studies were read in full text. The reasons for in- and exclusion were documented for every record (Appendix A).

2.4. Methodological appraisal

Tools for the methodological evaluation of incidence and prevalence studies are less established [16–18]. Appraisal criteria are not comparable and separate ratings of external and internal validity are often not possible [19]. The distinction between external and internal validity is important to evaluate the nature and impact of bias of the primary studies. Therefore, we used the standardized risk of bias tool introduced by Hoy et al. [20] to critical appraise the incidence and prevalence studies. This tool was originally developed to assess the risk of bias in prevalence studies, but the items were considered also appropriate for evaluating the methodological quality of incidence studies. It includes 10 items. The section external validity includes following items: target population and sampling frame, random selection and non-response bias. The process and mode of data collection, case definition, reliability and validity of used study instruments and information's about

prevalence reporting and transparency are items addressing internal validity. According to the user instructions the category "high risk" must be selected for items with insufficient information. An additional summary item asks for overall low, moderate or high risk of bias. Based on current state of methodological research there seem to be no tools for evaluating the methodological quality of secondary data analysis [21]. Nevertheless, the methodological quality of those studies was appraised by the same risk of bias tool.

2.5. Data extraction and analysis

Data extraction was conducted using a standardized data collection form. It contained source (author and year of publication), country, design, setting and sample characteristics, inclusion criteria and main results. The samples were described according to four characteristics: number of institutions/practices; number of participants; mean age and/or age groups and gender. Data were extracted age-specific or as given in the publication. Due to the heterogeneity between studies a pooling of extracted prevalence and incidence data was impossible. Results were analyzed and compared descriptively in relation to settings and regions. Possible associations between prevalence, age and setting were described using a scatter plot for pressure ulcers, because most epidemiologic data were extracted for this condition.

3. Results

3.1. Study selection, risk of bias and data extraction

The database and additional searches resulted in 1491 records after removing duplicates. In total 229 studies were read in full text from which 74 were included for analysis. Of these, 51 were primary studies including 41 prevalence four incidence studies and six prevalence and incidence studies. 23 secondary data analyses were included. Of these, 13 reported prevalence, four incidence and six secondary data analyses reported both prevalence and incidence estimates. According to the four search strategies 30 references reported findings about pressure ulcers or skin tears (Appendix C), two reported results about incontinence-associated dermatitis (Appendix D), eight about dry skin conditions like Xerosis cutis (Appendix E), one about allergies (Appendix F), five presented results about skin cancer (Appendix G), 13 reported findings about fungal infections and 14 reported more than one type of skin condition (Appendix I).

The main reason for exclusion were a too young age group or that the data for the age group 65+ years were not extractable. The detailed reasons for exclusion are listed in Appendix A. The flow of study selection is shown in Fig. 1.

Results of the risk of bias assessment are shown in Appendix B. Twenty five studies were rated as "low risk", most studies were rated as "moderate risk" (43/74) and only six had a "high risk" of bias. The most frequent reasons for higher risk of bias ratings was possible non-response (57/74) and non-random selection (33/74). Forty four out of 74 studies were rated at risk of bias regarding the reliability and validity of the used instruments.

3.2. Study characteristics

The study characteristics and the results are shown in the Appendices C to I. Most point estimates were identified for hospital settings (38.7%) and long-term care settings (29.7%). There were only few estimates available for non-institutional settings like domesticity (people living at home independently without receiving any care) (14.9%), medical practices (12.2%) and least often for home care (5.4%). The numbers per geographical area and setting of