EISSN 2687-2625

Academic Geriatrics Society

Eur J Geriatr Gerontol

# European Journal of Geriatrics and Gerontology

2019
Volume: 1
Issue: 3
December



www.ejgg.org

galenos yayınevi

EJGG
European Journal of Geriatrics and Gerontology
Academic Geriatrics Society
2019
Volume 1

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**Web:** www.galenos.com.tr
**Publisher Certificate Number:** 14521 **Printing Date:** November 2019 **E-ISSN:** 2687-2625
International periodical journal published three times in a year.

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*Reviewing the articles' conformity to the publishing standards of the Journal, typesetting, reviewing and editing the manuscripts and abstracts in English and publishing process are realized by Galenos.*

European Journal of Geriatrics and Gerontology

2019
Volume 1

EJGG

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European Journal of Geriatrics and Gerontology is the official open access scientific publication organ of the Academic Association of Geriatrics. It is a double peer-reviewed journal published quarterly in April, August and December.

The target audience of the journal includes physicians working in the fields of geriatrics and gerontology and all other health professionals who are interested in these topics.

The editorial processes of the journal are shaped in accordance with the guidelines of the international organizations such as the International Council of Medical Journal Editors (ICMJE) (http://www.icmje.org) and the Committee on Publication Ethics (COPE) (http://publicationethics.org).

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European Journal of Geriatrics and Gerontology

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The journal should be abbreviated as "Eur J Geriatr Gerontol" when referenced.

The European Journal of Geriatrics and Gerontology accepts invited review articles, research articles, brief reports, case reports, letters to the editor, and images that are relevant to the scope of geriatrics and gerontology, on the condition that they have not been previously published elsewhere. Basic science manuscripts, such as randomized, cohort, cross-sectional, and case control studies, are given preference. All manuscripts are subject to editorial revision to ensure they conform to the style adopted by the journal. There is a double blind kind of reviewing system.

The Editorial Policies and General Guidelines for manuscript preparation specified below are based on "Recommendations for the Conduct, Reporting, Editing, and Publication of Scholarly Work in Medical Journals (ICMJE Recommendations)" by the International Committee of Medical Journal Editors (2013, archived at http://www.icmje.org).

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European Journal of Geriatrics and Gerontology's editor and Editorial Board members are active researchers. It is possible that they would desire to submit their manuscript to European Journal of Geriatrics and Gerontology. This may be creating a conflict of interest. These manuscripts will not be evaluated by the submitting editor(s). The review process will be managed and decisions made by editor-in-chief who will act independently. In some situation, this process will be overseen by an outside independent expert in reviewing submissions from editors.

## Preparation of Manuscript

Manuscripts should be prepared according to ICMJE guidelines (http://www.icmje.org).

Original manuscripts require a structured abstract. Label each section of the structured abstract with the appropriate subheading (Objective, Materials and Methods, Results, and Conclusion). Case reports require short unstructured abstracts. Letters to the editor do not require an abstract. Research or project support should be acknowledged as a footnote on the title page.

Technical and other assistance should be provided on the title page.

## Title Page

**Title:** The title should provide important information regarding the manuscript's content.

The title page should include the authors' names, degrees, and institutional/professional affiliations, a short title, abbreviations, keywords, financial disclosure statement, and conflict of interest statement. If a manuscript includes authors from more than one institution, each author's name should be followed by a superscript number that corresponds to their institution, which is listed separately. Please provide contact information for the corresponding author, including name, e-mail address, and telephone and fax numbers.

**Running Head:** The running head should not be more than 40 characters, including spaces, and should be located at the bottom of the title page.

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**Conflict of Interest Statement:** To prevent potential conflicts of interest from being overlooked, this statement must be included in each manuscript. In case there are conflicts of interest, every author should complete the ICMJE general declaration form, which can be obtained at: http://www.icmje.org/coi_disclosure.pdf

**Abstract and Keywords:** The second page should include an abstract that does not exceed 300 words. Moreover, as various electronic databases integrate only abstracts into their index, important findings should be presented in the abstract.

## Abstract

**Objective:** The abstract should state the objective (the purpose of the study and hypothesis) and summarize the rationale for the study.

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Other types of manuscripts, such as case reports, reviews and others will be published according to uniform requirements. Provide at least 3 keywords below the abstract to assist indexers. Use terms from the Index Medicus Medical Subject Headings List (for randomized studies a CONSORT abstract should be provided (http://www.consort-statement.org).

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## Original Articles

Original articles should have the following sections;

**Introduction:** The introduction should include an overview of the relevant literature presented in summary form (one page), and whatever remains interesting, unique, problematic, relevant, or unknown about the topic must be specified. The introduction should conclude with the rationale for the study, its design, and its objective(s).

**Materials and Methods:** Clearly describe the selection of observational or experimental participants, such as patients, laboratory animals, and controls, including inclusion and exclusion criteria and a description of the source population. Identify the methods and procedures in sufficient detail to allow other researchers to reproduce your results. Provide references to established methods (including statistical methods), provide references to brief modified methods, and provide the rationale for using them and an evaluation of their limitations. Identify all drugs and chemicals used, including generic names, doses, and routes of administration. The section should include only information that was available at the time the plan or protocol for the study was devised on STROBE (http://www.strobe-statement.org).

**Statistics:** Describe the statistical methods used in enough detail to enable a knowledgeable reader with access to the original data to verify the reported results. Statistically important data should be given in the text, tables and figures. Provide details about randomization, describe treatment complications, provide the number of observations, and specify all computer programs used.

**Results:** Present your results in logical sequence in the text, tables, and figures. Do not present all the data provided in the tables and/or figures in the text; emphasize and/or summarize only important findings, results, and observations in the text. For clinical studies provide the number of samples, cases, and controls included in the study. Discrepancies between the planned number and obtained number of participants should be explained. Comparisons, and statistically important values (i.e. p value and confidence interval) should be provided.

**Discussion:** This section should include a discussion of the data. New and important findings/results, and the conclusions they lead to should be emphasized. Link the conclusions with the goals of the study, but avoid unqualified statements and conclusions not completely supported by the data. Do not repeat the findings/results in detail; important findings/results should be compared with those of similar studies in the literature, along with a summarization. In other words, similarities or differences in the obtained findings/results with those previously reported should be discussed.

**Study Limitations:** Limitations of the study should be detailed. In addition, an evaluation of the implications of the obtained findings/results for future research should be outlined.

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## Examples of References:

### 1. List All Authors

Bonanni E, Tognoni G, Maestri M, Salvati N, Fabbrini M, Borghetti D, DiCoscio E, Choub A, Sposito R, Pagni C, Iudice A, Murri L. Sleep disturbancesin elderly subjects: an epidemiological survey in an Italian district. ActaNeurol Scand 2010;122:389-397.

### 2. Organization as Author

American Geriatrics Society 2015 Updated Beers Criteria Expert panel. American geriatrics society 2015 updated Beer criteria for potentially inappropriate medication use in older adults. J Am Geriatr Soc 2015;63: 2227-2246.

### 3. Complete Book

Ham RJ, Sloane PD, Warshaw GA, Potter JF, Flaherty E. Ham's primary care geriatrics : a case-based approach, 6th ed. Philadelphia, Elsevier/Saunders, 2014.

### 4. Chapter in Book

BG Katzung. Special Aspects of Geriatric Pharmacology, In:Bertram G. Katzung,Susan B. Masters, Anthony J. Trevor (Eds). Basic and Clinical Pharmacology. 10th edition, Lange, Mc Graw Hill, USA 2007, pp 983-90.

### 5. Abstract

Reichenbach S, Dieppe P, Nuesch E, Williams S, Villiger PM, Juni P. Association of bone attrition with knee pain, stiffness and disability; a cross sectional study. Ann Rheum Dis 2011;70:293-8. (abstract).

### 6. Letter to the Editor

Rovner B. The Role of the Annals of Geriatric Medicine and Research as a Platform for Validating Smart Healthcare Devices for Older Adults. Ann Geriatr. 2017;21:215-216.

### 7. Supplement

Garfinkel D. The tsunami in 21st century healthcare: The age-related vicious circle of co-morbidity - multiple symptoms - over-diagnosis - over treatment - polypharmacy [abstract]. J Nutr Health Aging 2013;17(Suppl 1):224-227.

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# Instructions to Authors

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Case reports should be structured as follows:

**Abstract:** An unstructured abstract that summarizes the case.

**Introduction:** A brief introduction (recommended length: 1-2 paragraphs).

**Case Presentation:** This section describes the case in detail, including the initial diagnosis and outcome.

**Discussion:** This section should include a brief review of the relevant literature and how the presented case furthers our understanding to the disease process.

### Review Articles

Reviews should include a conclusion, in which a new hypothesis or study about the subject may be posited. Do not publish methods for literature search or level of evidence. Authors who will prepare review articles should already have published research articles on the relevant subject. There should be a maximum of two authors for review articles.

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Authors can submit for consideration an illustration and photos that is interesting, instructive, and visually attractive, along with a few lines of explanatory text and references. No abstract, discussion or conclusion are required but please include a brief title.

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Letters can include no more than 600 words of text, 10 references, and 1 figure or table. No abstract is required, but please include a brief title.

**Invited Review Article:** Invited review articles are comprehensive analyses of specifictopics in medicine, which are written upon invitation due to extensive experience and publications of authors on there view subjects. All invited review articles will also undergo peer review prior to acceptance.

**Editorial Comment:** Editorial comments are a briefremark on an article published in the journal by there viewer of the article or by a relevantauthority. Most comments are invited by the Editor-in-Chief but spontaneous comments are welcome. An abstract is not required with this type of manuscripts.

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| Article Type | Abstract (words) | Document (words) (excluding references) | References | Total Tables and Figures |
|---|---|---|---|---|
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| Invited Review Article | 300 | 3500 | 75 | 5 |
| Case Reports | 100 | 1000 | 15 | 2 |
| Images | None | 500 | 10 | 2 |
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| Editorial Comment | None | 1500 | 20 | 2 |

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Each author should have participated sufficiently in the work to assume public responsibility for the content. Any portion of a manuscript that is critical to its main conclusions must be the responsibility of at least 1 author.

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All submissions should contain a contributor's statement page. Each manuscript should contain substantial contributions to idea and design, acquisition of data, or analysis and interpretation of findings. All persons designated as an author should qualify for authorship, and all those that qualify should be listed. Each author should have participated sufficiently in the work to take responsibility for appropriate portions of the text.

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# Instructions to Authors

### Ethics

When reporting experiments conducted with humans indicate that the procedures were in accordance with ethical standards set forth by the committee that oversees human experimentation. Approval of research protocols by the relevant ethics committee, in accordance with international agreements (Helsinki Declaration of 1975, revised 2013 available at http://www.wma.net/e/policy/b3.html "Guide for the Care and use of Laboratory Animals" www.nap.edu/catalog/5140.html ), is required for all experimental, clinical, and drug studies. Studies performed on human require ethics committee certificate including approval number. It also should be indicated in the "Materials and Methods" section. Patient names, initials, and hospital identification numbers should not be used. Manuscripts reporting the results of experimental investigations conducted with humans must state that the study protocol received institutional review board approval and that the participants provided informed consent.

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4. All authors are responsible for the manuscript's content
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# Instructions to Authors

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The ORCID (Open Researcher and Contributor ID) number of the correspondence author should be provided while sending the manuscript. A free registration can create at http://orcid.org.

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# CONTENTS

REVIEW

**DOI:** 10.4274/ejgg.galenos.2019.102
Eur J Geriatr Gerontol 2019;1(3):70-77

# Overview of Geriatrics Studies via the 14th EUGMS (European Geriatric Medicine Society) Congress 2018: From Turkey's Point of View

**Fatma Özge Kayhan Koçak, Sevnaz Şahin, Selahattin Fehmi Akçiçek**

*Ege University Faculty of Medicine, Department of Internal Medicine, Division of Geriatrics, İzmir, Turkey*

## Abstract

New developments in the field of health should be organized according to aging and cover older people. For this purpose, the European Geriatric Medicine Society organized a congress titled "Advancing Geriatric Medicine in a Modern World" in this year. Symposium covered a wide variety of topics in geriatric medicine, such as geriatric approaches in common chronic diseases, new evaluation methods and treatments in geriatric syndromes. The aim of this study was to evaluate geriatrics studies in Turkey with a critical perspective in order to keep up with the evolving world. All multidisciplinary studies in Turkey involve collaboration among healthcare professionals only. Participants from different disciplines were not only informed of the latest developments in geriatric medicine; also, they had the opportunity to exchange views in this area through the congress. It is thanks to the congress, that geriatrics has been making efforts to be more inclusive in Turkey.

**Keywords:** Congress report, EUGMS, geriatrics studies

## Introduction

Human life span is prolonged with the new developments in the field of technology and medicine. Consequently, the population is aging in the whole world, especially in Europe. New developments in the field of health should be organized according to aging and cover older people. For this purpose, the European Geriatric Medicine Society (EuGMS) organizes a congress every year since 2005 to give geriatric viewpoint to all clinicians interested in advanced age patients. "Advancing Geriatric Medicine in a Modern World" was the name of 14th congress in October 2018.

The 14th EuGMS Congress was held from the 10th to the 12th of October 2018 in Berlin, Germany, and had gathered more than 1800 participants from 65 countries. The 14th congress was opened with a concert of Johann Sebastian Bach music, after a great speech on the creativity of Johann Sebastian Bach on October 10, 2018.

The aim of this year's congress was to focus on developments that were significantly affected by technological and pharmaceutical innovations, and to present new concepts that have evolved from the traditional principles of geriatric medicine. Additionally, it emphasized the diversity of the expertise, and provided new ideas and insights for the clinicians working with older patients anywhere in the world. Also, the 14th EuGMS Congress provided the participants the opportunity to access to the latest experiences in the field of geriatric medicine in the entire world.

The data were compiled from the 14th EuGMS congress booklet and its abstract book. We examined oral and poster presentation distributions by determined topics.

### The Community Booth-The Global Europe Initiative

Since last year, EuGMS has expanded its span to all members of the World Health Organization European Region by including Belarus, Israel, Lithuania, Russia, and Turkey.

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**Received:** Jul 17, 2019 **Accepted:** Oct 19, 2019

**This study was presented at 2nd International and 12th Academic Geriatrics Congress.**

**Cite this article as:** Kayhan Koçak FÖ, Şahin S, Akçiçek SF. Overview of Geriatrics Studies via the 14th EUGMS (European Geriatric Medicine Society) Congress 2018: From Turkey's Point of View. Eur J Geriatr Gerontol 2019;1(3):70-77

Henceforth, Turkey is a full board member of EuGMS. At this year's congress, a new initiative, called "Community Booth", was launched. This community aimed to share more information about the work of the EuGMS and its national society members, and especially reinforce the relations and collaboration with new members in Eastern and Southern Europe. EuGMS stated that the "Global Europe Initiative" aims to make special efforts to increase the development of geriatrics in countries where it is still in its infancy. Another aim of the society was to be more inclusive of the parts of the topics in geriatric medicine which financial support is especially difficult. Therefore, the society has also provided travel and other grants to participants who make presentations on this topic.

### Special Interest Groups

The group had two scope as "Special Interest Groups" (SIG) and "Task and Finish Groups" (T&FG). The program of these groups was announced on the official website of EuGMS, for about one week prior to the event. SIG allowed members to share their ideas or networks, exchange views, share best practices with their peers, and develop scientific research on geriatric medicine (Figure 1). T&FG was designed to examine any service, research, policy or issue that influenced the SIG. SIG could be formed for any subject by at least five members from at least five different member countries. SIG topics of 2018 congress were; 1) Vaccines 2) Cardiovascular medicine 3) Systematic review and meta-analysis 4) Frailty 5) Education & Training 6) Geriatric rehabilitation 7) Long term care 8) Pharmacology 9) Nutrition 10) Sarcopenia 11) Palliative care. T&FG titles for year 2018 were "the fall risk increasing drugs" and "gerodontology". All participants can join to these groups, but they should be EuGMS members if they wish to continue attending meetings.

### Symposiums

A total of 70 concurrent symposiums (170 speakers), including eight presentations, were presented. Symposium covered a wide variety of topics in geriatric medicine, such as geriatric approaches in common chronic diseases, new evaluation methods and treatments in geriatric syndromes, long term care (palliative care and intensive care) and the importance of multidisciplinary study. Table 1 depicts whole list of topics. In particular, new developments have been witnessed more closely through sessions of associations such as the European Academy for Medicine of Age (EAMA), the International Association of Gerontology and the Geriatrics for the Europe (IAGG EU). There were three symposium sessions of EAMA; one of them was regarding "research and publication" and the other two were about sarcopenia and comprehensive geriatric assessment. With the fact that the EAMA was directed towards researchers who were at the early stages of their careers, the topics were shed light on the young clinicians' current problems relating to academic life.

### The Organizers and Program Committee

Prof. Md. Jürgen Bauer served as the congress chair and Prof. Md. Anne Ekdahl served as the secretary general. The local committee consisted of 16 people, one of them being the congress chair, from various health care institutions in Germany. Countries with full board membership: Austria, Belarus, Belgium, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Latvia, Lithuania, Luxembourg, Malta, Norway, Poland, Portugal, Romania Russia, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, the Netherlands, Turkey and the UK. The observer countries are Albania, Bulgaria, Croatia, and Cyprus. IAGG-ER (International Association of Gerontology and Geriatrics European Region) was represented by Mario Barbagallo, EAMA was represented by Nele Van Den Noortgate, UEMS-GMS (European Union of Medical Specialists Geriatric Medicine Section) was represented by Jaap Krulder.

One hundred and twenty-six oral presentations (Table 2) and 894 poster presentations were made in this congress. The presentations were selected by the program committee according to evaluation of the submitted abstracts. Oral presentations were organized in 14 sessions; 1) Metabolism and nutrition 2) Pre and post-operative care and geriatric rehabilitation 3) Frailty and sarcopenia 4) Longevity and


**Figure 1.** Targeted opportunities of SIG by EuGMS. SIG is interested in topics which are being foreseen as they will gradually become common problems of geriatric medicine. SIG ensures its members valuable contacts by giving them chance to meet the right people, work with people who are active in, and passionate about their field. Organizing seminars, workshops or symposia can help SIG's members to develop their knowledge, and so SIG's members may meet a wide variety of people to gain insight into topical, relevant and challenging issues in specialist areas

*SIG: Special Interest Groups, EuGMS: the European Geriatric Medicine Society*

**Table 1. Symposium topics in the 14th EuGMS congress**

| | Topics |
|---|---|
| **SIG-T&FG** | Diabetes |
| | Palliative care |
| | Gerontodontology |
| | On fall risk increasing drugs |
| | Long-term care |
| | Frailty and resilience |
| **EUGMS symposiums** | EDA-delirium |
| | IAGG-EU-meaning of ageing |
| **Submitted symposiums** | Osteosarcopenia |
| | Pharmacology (PIM) |
| | Education & training |
| | Cognition and dementia (2) |
| | Geriatrics in organ disease (calcium and vitamin D supplementation) |
| | Cognition and dementia |
| | Geriatric rehabilitation |
| | Gerotechnology |
| **Lectures** | Geriatrics in organ disease (osteoporosis) |
| | Geriatrics in organ disease (syncope & transient loss of consciousness) |
| | Pharmacology (polypharmacy) |
| | Frailty and sarcopenia |
| **Pros and cons session** | Cognition and dementia |
| | Frailty and malnutrition |
| **Sponsored symposiums** | Metabolism and nutrition |
| | Vaccines and immunization |
| | Frailty and sarcopenia |
| | Frailty and sarcopenia |
| | Urinary incontinence |
| | Vaccines and immunization |
| | Metabolism and nutrition |
| | Frailty and sarcopenia |
| | Vaccines and immunization |
| **EAMA workshops** | Education & training |
| | Frailty and sarcopenia |
| | Geriatrics in organ disease |
| **Other topics** | Geriatrics in organ disease (6) (anemia, cardiovascular disease, hypertension, atrial fibrillation etc.) |
| | Gerotechnology |
| | Cognition and dementia (3) |
| | Oral health in older adults |
| | Frailty and sarcopenia (4) |
| | Multimorbidity and comprehensive geriatric assessment (fall, oropharyngeal dysphagia) |
| | Metabolism and nutrition |
| | Geriatric rehabilitation (5) |
| | Geriatric rehabilitation (5) |
| | Longevity and prevention |
| | Pharmacology (polypharmacy) |
| | Vaccines and immunization (infections) |
| | Acute care (emergency department) |

SIG: Special Interest Groups, T&FG: Task and Finish Groups, EUGMS: The European Geriatric Medicine Society, EDA: European Delirium Association, IAGG-EU: The International Association of Gerontology and Geriatrics European, PIM: Potentially Inappropriate Medications, EAMA: The European Academy for Medicine of Age

prevention 5) Comorbidity and multimorbidity 6) Geriatric education 7) Organization of care and gerotechnology/urology and continence management/Vaccines and immunization 8) Multimorbidity and comprehensive geriatric assessment 9) Acute care 10) Cognition and dementia 11) Biogerontology and genetics 12) Delirium/Geriatrics in organ disease 13) Ethics and end of life care 14) Pharmacology. Oral presentations were made from 27 different countries' representatives. According to number of oral presentations, the top four countries, also known as The Big Four in advanced global economies of Western Europe, were United Kingdom (UK), Italy, France, and Germany respectively (Table 3).

Popular culture is a concept that can be considered as one of the effects of social modernization in the 20th century. The impact of popular culture was seen particularly on metabolism and nutrition topics, such as "eating more fruit and vegetables for happiness" or "fall risk by your body shape". Another noteworthy point was the perspective of successful aging. Kahn and Rowe (1997) defined that successful aging is combination of the avoidance of disease and disability, active engagement in social life and high cognitive, and physical functioning. However, the meaning of successful aging is changed according to multidimensional perceptions of older adults, accepting the aging process, culture, and so objective measures are required instead of subjective measures (1). The most of oral presentations were focused on successful aging based on longevity (aged 90 years and over). The reason could be the change of population distribution by age, by virtue of longer life expectancy. Also, the increasing research on telomeres and aging may be an impact of both the long-life expectancy and popular culture.

All oral presentations on geriatric education topics, except one, were intended only to medical students. On the other hand, studies about staff education were presented on session of ethics and end of life care. Studies supposed that healthcare professionals (except for the doctor) took part only in long-term care. As a result, geriatric training is requirement for all healthcare professionals. When PhD in older patient

care will become more widespread in all parts of the world, all healthcare professionals' training will be considered important.

Geriatric syndromes are the clinical conditions that are frequently seen in older patients and could cause impairment of quality of life and increased morbidity and mortality. Pre-existing comorbidity in older adults is negatively associated with functional rehabilitation outcome after surgical procedures, such as hip fracture (2), and pre-operative comprehensive geriatric assessment is important to reduce the rate of adverse postoperative outcome (3). The majority of the presented surgical researches were about hip fractures. Hip fracture is associated with geriatric syndrome, such as falls, frailty, malnutrition, and it is approached as a new geriatric syndrome.

There was only a presentation about vaccines and immunization, although it's important in the population aged 65 and over. Immunization is an important part of health in older adults, not only in childhood. One of the aims of this congress is to create awareness. I strongly believe that vaccination studies should be more presented in congress.

**Table 2. Oral presentations**

| Continent | Country | P | E | D | B | CD | AC | M | OG | CM | GE | LP | FS | PO | MN | n | % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| European | UK | 1 | 1 | 2 | 2 | 1 | 1 | - | 1 | 1 | 3 | 1 | - | 2 | - | 16 | 12.6 |
| | Italy | 1 | - | 2 | - | - | 3 | 1 | 2 | 3 | - | - | - | 2 | 1 | 15 | 12 |
| | France | - | 2 | 1 | 3 | 1 | 2 | - | 2 | - | 1 | - | 1 | 1 | - | 14 | 11 |
| | Germany | 1 | - | - | 1 | - | - | 1 | 1 | - | - | 3 | 2 | 2 | 3 | 14 | 11 |
| | Netherlands | 1 | - | 1 | - | 1 | 1 | 2 | - | - | 2 | 1 | 1 | - | 1 | 11 | 9 |
| | Sweden | - | - | - | - | 2 | - | 1 | - | 1 | - | 1 | 2 | - | - | 7 | 5.5 |
| | Finland | 1 | 1 | - | - | - | - | - | - | - | - | 2 | 1 | - | 1 | 6 | 4.7 |
| | Spain | - | - | - | 2 | 1 | 1 | - | - | - | - | - | - | 1 | - | 5 | 4 |
| | Norway | - | 1 | - | - | 2 | 1 | - | 1 | - | - | - | - | - | - | 5 | 4 |
| | Ireland | - | - | 1 | - | - | - | 2 | 1 | - | - | - | - | - | - | 4 | 3 |
| | Belgium | - | - | - | - | - | - | 1 | - | - | - | - | 2 | - | - | 3 | 2.5 |
| | Switzerland | - | 1 | - | - | - | - | - | - | - | 1 | - | - | - | 1 | 3 | 2.5 |
| | Denmark | 1 | - | 1 | - | - | - | - | - | - | - | - | - | - | - | 2 | 1.5 |
| | Poland | - | 1 | 1 | - | - | - | - | - | - | - | - | - | - | - | 2 | 1.5 |
| | Romania | - | 1 | - | - | - | - | - | - | - | - | - | - | - | - | 1 | 0.8 |
| | Portugal | 1 | - | - | - | - | - | - | - | - | - | - | - | - | - | 1 | 0.8 |
| | Greece | - | - | - | - | - | - | - | - | - | 1 | - | - | - | - | 1 | 0.8 |
| | Iceland | - | - | - | - | - | - | - | - | - | - | - | - | - | 1 | 1 | 0.8 |
| | Turkey | - | - | - | - | - | - | - | - | 1 | - | - | - | - | - | 1 | 0.8 |
| | **Total** | | | | | | | | | | | | | | | **112** | **89** |
| America | Canada | - | 1 | - | - | - | - | - | - | 1 | - | - | - | - | - | 2 | - |
| | USA | - | - | - | - | - | - | - | - | - | 1 | - | - | - | - | 1 | - |
| | Mexico | - | - | - | - | - | - | - | - | 1 | - | - | - | - | - | 1 | - |
| | **Total** | | | | | | | | | | | | | | | **4** | 3 |
| Asia | Israel | 1 | - | - | - | - | - | - | - | - | - | - | - | - | - | 1 | - |
| | Korea | - | - | - | - | - | - | - | - | - | - | - | - | 1 | - | 1 | - |
| | Malaysia | - | - | - | - | - | - | - | - | - | - | - | - | - | 1 | 1 | - |
| | Japan | - | - | - | - | 1 | - | 1 | 1 | 1 | - | 1 | - | - | - | 5 | - |
| | **Total** | | | | | | | | | | | | | | | **8** | 6 |
| Australia | | 1 | - | - | 1 | - | - | - | - | - | - | - | - | - | - | 2 | - |
| | **Total** | | | | | | | | | | | | | | 2 | 2 | |
| **Total** | | **9** | **9** | **9** | **9** | **9** | **9** | **9** | **9** | **9** | **9** | **9** | **9** | **9** | **9** | **126** | **100** |

P: Pharmacology, E: Ethics and end of life care/cognition and dementia/acute care, D: Delirium/geriatrics in organ disease, B: Biogerontology, Frailty and sarcopenia, CD: Cognition and dementia, AC: Acute care, M: Multimorbidity and comprehensive geriatric assessment, OG: Organisation of care and gerotechnology/urology and continence management/vaccines and immunization, CM: Comorbidity and multimorbidity, GE: Geriatric education, LP: Longevity and prevention, FS: Frailty and sarcopenia, PO: Pre and post-operative care and geriatric rehabilitation, MN: Metabolism and nutrition

**Table 3. Poster presentations**

| | Country | P | PO | V | B | FS | GE | GR | Gİ | L | M | R | O | AC | CD | CM | C | DE | E | P | İ | N |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| European | UK | 3 | 7 | 2 | 1 | 11 | 10 | 8 | 2 | 4 | 5 | 1 | 6 | **17** | 16 | 4 | 7 | 6 | 4 | 2 | 1 | 117 |
| | Spain | 3 | 9 | 2 | | **17** | 2 | 6 | 6 | | 7 | | 1 | 8 | 9 | 6 | 5 | 4 | 1 | 1 | | 87 |
| | France | 14 | 3 | 2 | 3 | **8** | 2 | 1 | 3 | 1 | 2 | | 7 | 7 | **8** | 3 | 3 | 2 | 2 | 1 | 1 | 73 |
| | Turkey | 2 | 1 | | | **15** | 1 | 3 | 3 | 1 | 5 | | 2 | 1 | 7 | **8** | **12** | | | **3** | 1 | 65 |
| | Italy | 2 | 3 | | 1 | 7 | 3 | 2 | 1 | 3 | 1 | | 2 | 6 | 5 | **10** | 9 | 5 | 2 | | | 62 |
| | Germany | 7 | | | | 6 | 1 | **13** | 1 | 4 | 1 | 2 | | 4 | 5 | 3 | 9 | 1 | | 1 | | 58 |
| | Netherlands | 7 | 3 | | 2 | 4 | | **8** | | 4 | 2 | | 2 | 5 | 5 | 2 | 1 | 2 | 6 | | 2 | 55 |
| | Portugal | 1 | | 1 | | **8** | | 4 | | 1 | 1 | | | 4 | 2 | 4 | 3 | 1 | | | | 30 |
| | Belgium | 4 | | | | **8** | | 1 | 1 | | | | 4 | 1 | 1 | 3 | | | 1 | | | 24 |
| | Poland | | | | | 4 | | | 1 | 1 | 1 | | 1 | | 1 | 2 | 7 | | | 1 | | 19 |
| | Romania | | 3 | | | | | 1 | 3 | 2 | 1 | | 1 | 1 | 1 | 2 | 2 | | | | | 17 |
| | Ireland | 1 | | | | 1 | | | | 2 | | | | | **7** | | 1 | 1 | | 1 | | 14 |
| | Denmark | 2 | | | | 4 | | | | 1 | 1 | | 1 | 2 | | 2 | 1 | | | | | 14 |
| | Finland | | 1 | | | | | | | | 2 | | | | **9** | | | | 1 | | | 13 |
| | Norway | 1 | 1 | | | | 1 | 1 | 1 | 3 | | | 1 | | 1 | 1 | 1 | 1 | | | | 13 |
| | Lithuania | 1 | | | | 1 | | 2 | | 1 | 3 | | 2 | | | 1 | | | | | | 11 |
| | Sweden | 1 | | | | 1 | | 1 | 1 | 1 | | | | | 3 | 1 | 1 | | | | | 10 |
| | Iceland | | | | | 3 | | | | 1 | 4 | | 2 | | | | | | | | | 10 |
| | Switzerland | | | | | | | | | | | | | 1 | 2 | 1 | 2 | | | | | 6 |
| | Malta | 2 | | | | | | 1 | | | | | 1 | | 1 | | | | | 1 | | 6 |
| | Czech Republic | 1 | | | 1 | | | | 1 | | | | | | 2 | | | | | | | 5 |
| | Croatia | | | | | | 3 | | | | | | 1 | | | | | | 1 | | | 5 |
| | Greece | | | | | | | | | 1 | | | | | | 3 | | | | | | 4 |
| | Austria | | 1 | | | 1 | | | | 1 | | | | | | | | | | | | 3 |
| | Luxembourg | | | | | | | | | 1 | | | | | | | | | 1 | | | 2 |
| | Slovenia | | | | | | | | | | | | | | | 1 | | | | | | 1 |
| | Belarus | | | | | | | | | | | | | | | 1 | | | | | | 1 |
| | Total | | | | | | | | | | | | | | | | | | | | | **725** |
| America | USA | | | 3 | | | 3 | 1 | | | 1 | | 1 | 1 | 1 | 1 | | | 1 | | | 13 |
| | Brazil | 1 | | 1 | | | | | 1 | | 1 | 1 | | | 1 | 2 | | | 1 | | | 9 |
| | Canada | 4 | | | | | | | | 1 | | | | | | 2 | | | | | | 7 |
| | Mexico | | | | | 1 | 1 | | | | | | | 1 | 1 | | | | | | | 4 |
| | Chile | | | | | 1 | | | | | | | | | 1 | | | | | | | 2 |
| | Argentina | | | | | | 1 | | | | | | | | | | | | | | | 1 |
| | Colombia | | | | | | | | | | | | | 1 | | | | | | | | 1 |
| | Total | | | | | | | | | | | | | | | | | | | | | **37** |

| | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Asia** | Japan | 3 | | | 5 | | | 2 | 4 | 1 | 1 | | | 3 | | | | | 2 | 1 | | 22 |
| | Russia | 3 | | 1 | 1 | | | | | | | | | 3 | 3 | | | | | | | 11 |
| | Israel | | | | | | 2 | | | 1 | 1 | 1 | | | 2 | 2 | | | 1 | 1 | | 11 |
| | Korea | | 1 | | 4 | | | 2 | 1 | 1 | | | 1 | | | | | | | 1 | | 11 |
| | Singapore | | 2 | | | | | | | 1 | | | 1 | 2 | | | | | | | | 6 |
| | Iran | | | | 1 | | 1 | 2 | | | | | | 1 | | | | | | 1 | | 6 |
| | Lebanon | | | | | 2 | | | | 1 | | | | | | 3 | | | | | | 6 |
| | Qatar | | 1 | | | 1 | | 1 | | | | | 1 | | 1 | | | | | | | 5 |
| | Taiwan | | | | | | | | 1 | | | | 1 | | | | 2 | | | | | 4 |
| | Thailand | | | | 1 | | | | | | | | | | | | | 2 | | | | 3 |
| | China | 1 | | | 1 | | | | | | | | | | | | | | | | | 2 |
| | Malaysia | | | | 1 | | | | | | | | | | | | | | | | | 1 |
| | Hong Kong | | | | | | | | | | | | | | | | | 1 | | | | 1 |
| | Saudi Arabia | | | | | | | | | | | | | | 1 | | | | | | | 1 |
| | Total | | | | | | | | | | | | | | | | | | | | | **90** |
| **Africa** | Tunisia | 1 | | | 2 | 1 | | 6 | 1 | 1 | | | | 1 | **10** | | | | | | | 23 |
| | Egypt | | | | | | | | 2 | | | | | | | | | | | | | 2 |
| | South Africa | 1 | | | | | | | | | | | | | | | | | | | | 1 |
| | Tanzania | | | | | | | | | | | | | | 1 | | | | | | | 1 |
| | Total | | | | | | | | | | | | | | | | | | | | | 27 |
| | Australia | 3 | | 1 | 2 | | | | | | 1 | | 1 | | | | | | | | | **8** |
| | Cyprus | | | | | 1 | | | | 1 | 1 | 1 | | | | | | | | 1 | | **6** |
| | New Zealand | | | | | | | | | | | | 1 | | | | | | | | | 1 |
| | **Total** | **69** | **34** | **13** | **10** | **119** | **33** | **56** | **38** | **43** | **45** | **7** | **38** | **66** | **100** | **81** | **69** | **25** | **27** | **15** | **6** | **894** |

P: Pharmacology, PO: Pre and post operative care and Geriatric rehabilitation, V: Vaccines and immunization, B: Biogerontology and genetics, FS: Frailty and sarcopenia, GE: Geriatric education, GR: Geriatric rehabilitation, Gi: Geriatrics in organ disease, L: Longevity and prevention, M: Metabolism and nutrition, O: Organisation of care and gerotechnology, AC: Acute care, CD: Cognition and dementia, CM: Comorbidity and multimorbidity, C: Comprehensive geriatric assessment, DE: Delirium, E: Ethics and end of life care, P: Psychiatric symptoms and illnesses, İ: Urology and continence management

In spite of the intensity of the presentation program, the speakers managed to finish their presentations on time. Attention and awareness of moderators contributed positively to this situation at oral presentations.

The poster presentations were delivered in 20 sessions concerning the following topics; pharmacology, pre and post-operative care, vaccines and immunization, biogerontology and genetics, frailty and sarcopenia, geriatric education, geriatric rehabilitation, geriatrics in organ disease, longevity and prevention, metabolism and nutrition, oral and dental health, organization of care and gerotechnology, acute care, cognition and dementia, comorbidity and multimorbidity, comprehensive geriatric assessment, delirium, ethics and end of life care, psychiatric symptoms and illnesses, urology and continence management. Considering subjects of poster presentations, highest number of posters were related to frailty and sarcopenia (119 posters) and cognition and dementia (100 posters).

Sixty-five poster presentations were sent from Turkey and more than half of them (36 posters) were cross-sectional study. Only four poster presentations were about International Study. Although geriatrics is a multidisciplinary field, a few of studies were made in collaboration with different scientific disciplines. All multidisciplinary studies in Turkey involve collaboration among healthcare professionals only. Gerontology takes part in Faculty of Arts and Sciences in Turkey. It is distinguished from

geriatrics which is a branch of medicine. Geriatrics should make efforts to be more inclusive in Turkey. Caregivers of the population aged 65 and older are also aging in Turkey, but even then, there is no presentation about the burden of caregivers. So, caregiver burden should be investigated now more than ever.

There are limitations of our article. Firstly, the data were compiled from the congress booklet and abstract book. Therefore, information, such as number of congress participants per country, could not be learned. In addition, poster and oral presentations were classified according to the first author's country, the multicenter studies have not been evaluated in a different table.

## Conclusion

Conferences and sessions on various topics related to the current situation, and future expectations of geriatric medicine were presented in the 14th Congress of the European Geriatrics Association. More than a third of the posters were sent from the European countries. The country with the maximum number of both poster and oral presentations was the UK.

Considering the poster presentations, it was seen that "frailty and sarcopenia" was one of the most popular topics investigated in the Europe. Poster presentations on the topics of frailty and sarcopenia were sent mostly from Spain (17 posters) and Turkey (15 posters). Most of the presented studies in these topics were about the most appropriate criteria for the diagnoses. Sarcopenia and frailty have emerged as crucial problems in the population aged 65 and older, and they represent a rapidly expanding field of research. Sarcopenia frequently overlaps with frailty, and both of them are increasing the risk of negative outcomes, such as disability and mortality. Therefore, they are increasingly viewed as two sides of the same coin (4).

Patients who are at risk for cognitive decline should be identified for developing an appropriate strategy. Intervention and treatment options should be evaluated according to cognitive decline. As a consequence, studies on cognitive function indicated that age-associated chronic diseases and drugs used in treatment were investigated. Also, pharmacology is of interest in other common diseases beside cognitive disorders. Remarkable issues in the field of pharmacology were the use of platelet antiaggregants/anticoagulants, psychiatric medications and anticholinergic burden which is one of frequently overlooked problems, as well as polypharmacy and inappropriate drug use that still maintains its importance.

Orthopedics was the surgical specialty that evaluated the most frequent physical performance while the most popular topic in geriatric education was cognitive function. Overall, it can be said that all presented studies in congress aim to improve the quality of life.

Majority of poster presentations on the topic of the vaccination-immunization were about varicella-zoster vaccine (six posters) and awareness of health care providers (five posters). When examined poster presentations, we noticed that many countries have started to practice routine varicella vaccination for people 60 years of age or older, by contrast with Turkey.

About one fifth of poster presentations on the topic of the comprehensive geriatric assessment were sent from Turkey, and both polypharmacy/inappropriate drug use and depression seemed to be of equal interest. There was a similar situation in psychiatric symptoms and diseases, Turkey was among the top three countries to send poster presentation on the topic of psychiatric symptoms and diseases, and poster presentations of this topic were sent from only 12 different countries. One of these presentations was about depression and the other two of them were about sleep disorders. There was no poster presentation from Turkey on vaccination-immunization, biogerontology/genetics, delirium and ethics/end of life care.

In biogerontology and genetics, telomere, immune aging and microbiota were studied and one third of the poster papers were from France. However, the studies that were sent from Italy and UK were conspicuous. Cherubini showed that Zonulin, a protein synthesized in intestinal and liver cells, can used to evaluate whether a polyphenol rich dietary pattern can modulate intestinal permeability. In addition, study of Scutt was about relation of adverse drug reactions and the *nuclear factor erythroid 2-like 2 (Nrf2)* gene, a regulatory antioxidant and xenobiotic defense gene, and was presented in both oral abstracts and poster abstracts. These researches have shed light on whether and how genetic predispositions influence with aging.

The least interest of the poster presentations topic was urinary incontinence, and only six poster papers were sent. Similarly, only one of the symposium issues was related to incontinence, and it was sponsored by a personal hygiene brand.

In summary, participants from different disciplines were not only aware of the latest developments in geriatric medicine, also they had the opportunity to exchange views in this area. It is thought that the synergy arising from the congress will contribute to the future applications of the geriatric medicine, while its importance is rapidly increasing all around the world. Moreover, the fact that the congress subjects are similar to the recent studies on geriatrics shows that the EuGMS congress stay up to date. In addition, attendance ratios of the congress from the United States (4%), Africa (3%), Australia and island countries (except Malta and UK) (2%) show that the European congress has an impact on the whole world. As expected, a broader vision of congress has emerged.

### Ethics

**Peer-review:** Internally and externally peer-reviewed.

### Authorship Contributions

Surgical and Medical Practices: F.Ö.K.K., S.Ş., S.F.A., Concept: F.Ö.K.K., S.Ş., S.F.A., Design: F.Ö.K.K., S.Ş., S.F.A., Data Collection or Processing: F.Ö.K.K., S.Ş., S.F.A., Analysis or Interpretation: F.Ö.K.K., S.Ş., S.F.A., Literature Search: F.Ö.K.K., Writing: F.Ö.K.K.

**Conflict of Interest:** No conflict of interest was declared by the authors.

**Financial Disclosure:** The authors declared that this study received no financial support.

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ORIGINAL RESEARCH

**DOI:** 10.4274/ejgg.galenos.2019.114
Eur J Geriatr Gerontol 2019;1(3):78-86

# Functional Evaluation Tests as Prognostic Factors of Falls in Elderly Patients

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## Abstract

**Objective:** Analysis of risk factors for falls through a detailed geriatric evaluation is essential. The aim of the present study was to analyze prognostic factors for falls in elderly patients in Spain.

**Materials and Methods:** a) Initial phase (n=247): transverse observational study. Inclusion criteria: patients >80 years old living alone and/or with a relative of similar age; b) Final phase (n=90): prospective cohort study of the previously enrolled patients. Variables analyzed included demographics; clinical characteristics and results of timed up and go (TUG) (mobility assessment) and Lobo (cognitive assessment) tests; Lawton-Brody Instrumental Activities of Daily Living scale and Barthel index (basic activities).

**Results:** Falls were significantly associated with changes in Lobo and Barthel test results during both phases. No association was found between falls and comorbidities, number or type of treatment received and analytical variables studied. No statistical difference was observed in TUG test between fallers and non-fallers in the initial phase. A significant deterioration was observed in Lobo, Lawton-Brody, Barthel and TUG evaluation tests during the 4-year in between-period; male gender and a lower score in Lobo test were independent variables related to mortality. In the final phase, a TUG cut-off value of 25 seconds (sensitivity=0.52; specificity=0.75), that differentiated fallers from non-fallers, was established.

**Conclusion:** Tests that evaluate cognitive ability and functional activities are predictors of falls in the elderly. The use of Lobo test to define the cognitive state of elderly patients may contribute to predict their vital prognoses.

**Keywords:** Elderly, fall, risk of fall, time get up and go test, Lobo test, Lawton-Brody test, Barthel test

## Introduction

Falls in elderly patients are a daily concern that occurs in almost half of them, with a wide range of consequences and whose importance is not recognized neither by themselves, nor their relatives, nor health professionals (1,2). They are seldom accidental, but rather the result of an inadequacy between the senior and his/her surroundings; hence the unawareness of the risk factors associated with the falls contributes to an increase in their incidence (3).

Extrinsic (environmental) as well as intrinsic (clinical factors) risk factors associated with falls have been previously described (4,5). The incidence of falls increases progressively with age, reaching 50% in individuals >80 years (6,7). A study conducted by our group established that the incidence of falls in individuals >80 years per number of patients/year ranged between 11.9% and 17.8%, with a mean value of 14.0% (6,8,9).

The analysis of the risk factors associated with falls through a geriatric assessment is a key element for their adequate management. Such assessment should include a multidimensional analysis (10,11): a) circumstances of the fall; b) comprehensive geriatric valuation: b1. biological evaluation (acute or chronic processes, as well as drug consumption, nutritional status, presence of other geriatric syndromes); b2. functional evaluation (Barthel and Lawton-Brody tests) (11,12); b3. Mental and psycho-affective evaluations (minimental state examination, or Lobo test (13), as well as depression scale);

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**Received:** Jul 27, 2019 **Accepted:** Oct 19, 2019

**Cite this article as:** Benitez J, Ignacio JM, Perea S, Giron JA. Functional Evaluation Tests as Prognostic Factors of Falls in Elderly Patients. Eur J Geriatr Gerontol 2019;1(3):78-86

b4. Social assessment (presence/absence of caregiver, housing situation, social relationships); c) evaluation of cardiovascular, neurological and musculoskeletal systems; d) ophthalmological examination; e) assessment of balance and gait; f) environmental assessment; g) specific complementary examinations: blood count, glycemia, ions, thyroid hormones, vitamin D, EKG, among others.

With regards to the assessment of balance and gait, although the Tinetti test was initially validated to predict the risk of falls, however, in daily clinical practice the test timed up and go (TUG) is currently used (14). This test presents a high correlation with the speed of the march, it is much easier to carry out, requires less time and has a strong correlation with Tinetti test (15,16).

In 2009 the "Comprehensive Plan for elderly individuals ≥80 years of age who live alone and/or with a relative with a similar age" was implemented in our center. The results of a preliminary study showed that: a) the most common locations of falls are corridor, bathroom, living room, bedroom and elevators; b) the risk of falls increases with the degree of dependence; c) The degree of dependence correlates with the results of the TUG test.

Based on those results, the present study was designed to analyze the frequency and factors involved (including the TUG, Lobo, Lawton-Brody and Barthel tests) in the risk of falls in elderly patients living alone and/or with a relative of similar age in the province of Cádiz, Spain.

## Materials and Methods

### Study Design

The study was conducted in Unidad de Gestión Clínica "La Laguna", Cadiz, Spain and was approved by the relevant health authorities and ethic committees. The study consisted of an initial phase (2013) and a final phase (2017): a) Initial phase: transverse observational study. Inclusion criteria: Patients >80 years living alone and/or with a relative of similar age. Those in whom the TUG test could not be carried out due to neurological alterations, trauma or rheumatic diseases were excluded from the final phase of the study; b) Final phase: prospective cohort study of the patients enrolled in 2013, followed until 2017. The electronic medical records were reviewed and once the cases were selected, patients were visited in their homes, and after obtaining the informed consent, collection of variables and performance of tests described below were performed.

### Study Outcomes

**1. Primary outcome:** To analyze factors (Lobo, Lawton-Brody, Barthel and TUG tests) involved in the development of falls in patients >80 years old years living alone and/or with a relative of similar age. Tests were conducted by primary care physicians. In particular, the following specific outcomes were studied:

a) Analysis of the frequency of falls

b) Establishment of the intrinsic risk factors associated with a higher frequency of falls.

c) Establishment of the predictive value of TUG test in the appearance of falls.

d) Association between cognitive level (Lobo test) and risk of falls.

e) Association between falls and the outcome regarding cognitive assessment (Lobo test), instrumental (Lawton-Brody tests) and basic (Barthel test) daily activities.

**2. Secondary outcomes:** Correlation between the levels of vitamin D and frequency of falls among elderly patients and predictive value of death of Lobo, Lawton-Brody, Barthel and TUG tests.

### Variables Analyzed

**1. Dependent variables:** Number of falls; number of deaths.

**2. Independent variables:** a) demographic (gender, age); b) Clinical characteristics: b.1) comorbidities: cardiological; neurological; respiratory; musculoskeletal system); metabolic/endocrine diseases; b.2) biochemistry values: hemoglobin; glycemia; glycated hemoglobin (HbA1c)(%); iron; ferritin; transferrin; vitamin B12; folic acid; total proteins; albumin; thyroid stimulating hormone (TSH); cholesterol; triglycerides; uric acid; creatinine; vitamin D (this latter only during final phase); c) functional evaluation tests: Lobo, TUG, Barthel and Lawton-Brody tests; d) drug treatments associated with a greater risk of falls (only during final phase).

### Instruments

**1. TUG Test:** Validated test in which the patient is time while they rise from a chair, walk 3 m, turn around, return to the chair, and sit down again. A faster time indicates a better functional performance. Reported threshold values vary from 10 to 33 seconds (17).

**2. Lobo Test (Mini Examen Cognoscitivo):** It is the Spanish validation/adaptation of the Folstein minimental state examination (MMSE), and consists of 35 items, and each correct answer is scored as 1 point. It evaluates six cognitive abilities (orientation, registration, attention and concentration, short-term memory and language), and takes 5-10 minutes to administer. The cutting point of advanced cognitive impairment stands at 24/35 points. The test has a sensitivity for diagnosis of 90.7% and a specificity of 69% (18).

**3. Lawton-Brody Test:** It is a validated instrument to assess independent living skills. There are eight domains of function measured with the Lawton IADL scale. A summary score

ranges from 0 (low function, dependent) to 8 (high function, independent) for women, and 0 through 5 for men (19).

**4. Barthel Index:** The Barthel index is a validated test that encompasses 10 items on motor tasks rated on a weighted ordinal scale with lower scores indicating more need for assistance to complete each activity. The maximum score is 100 points (90 if the patient is travelling in a wheelchair). The cutoff points are: a) 81-100, self-employed; b) 61-80, mild dependence; c) 46-69, moderate dependence, and d) <45, severe dependence (20,21).

### Statistics

For quantitative variables that follow a normal distribution (analyzed by Kolmogorov-Smirnov test), mean and the standard deviation were used; otherwise, median and interquartile range. Qualitative variables were expressed by number and percentage. Student's t-test was used for comparison of two means in case of parametric quantitative variables and with homogeneous variances, otherwise, Mann-Whitney U test was used. Qualitative variables were compared using the chi-square test, with Fisher correction whenever needed. The ROC curve of the TUG test, its positive and negative predictive values, as well as the establishment of a cut-off to determine the risk of falls was determined during the final phase. For the evaluation of the independent association of risk factors for falls and mortality, a logistic regression test was carried out, introducing in the model those factors that had reached statistical significance in the bivariate analysis. For data analysis, SPSS statistical package, version 20.0 (SPSS Inc. Chicago, IL, USA) was used. A level of significance of 95% ($p<0.05$) was considered.

## Results

### Initial Phase

During the years 2013-2017, a total of 342 that patients fulfilled all the inclusion criteria, from a pool population of 984 patients, were selected. Of those, 247 signed the informed consent and were enrolled in the initial phase of the study. The demographic and clinical characteristics as well as the frequency of falls are summarized in Table 1. The most common comorbidities were hypertension and rheumatic diseases, followed by diabetes mellitus and were not significantly associated with a higher risk of falls ($p>0.005$). With regards to functional evaluation tests, the profile of the elderly patient in this initial phase showed an acceptable cognitive level, with autonomy for the basic and instrumental daily life activities. Statistical significant differences were observed between those who have reported falls vs those who have not, with regards to cognitive level (Lobo test) and daily basic activities (Barthel test). As of TUG score, no significant difference was observed between

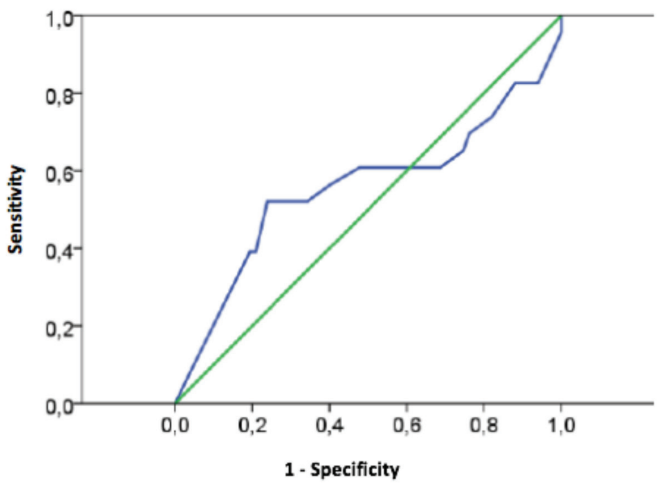
**Table 1. Initial and final phases: demographic and clinical characteristics**

| Demographics | Baseline phase (n=247) | Final phase (n=90) |
|---|---|---|
| **Gender (n, %M/F)** | 247 (30.8%/69.2%) | 90 (17.7%/82.3%) |
| **Age, mean (range), in years** | 89.2±3.6 (80-101) | 88.9±2.6 (83-96) |
| **Age ranges: n (%)** | | |
| 80-84 | 152 (61.5%) | 4 (4.4%) |
| 85-89 | 75 (30.4%) | 57 (63.3%) |
| ≥90 | 20 (8.1%) | 29 (32.2%) |
| **Falls (n, %)** | | |
| No | 65 (26.3%) | 67 (74.4%) |
| Yes | 182 (73.7%) | 23 (25.5%) |
| **Comorbidities (n, %)** | | |
| Hypertension | 128 (51.8%) | 42 (46.7%) |
| Diabetes mellitus | 51 (20.6%) | 18 (20.0%) |
| Rheumatological diseases | 61 (24.7%) | 25 (27.8%) |
| Cognitive impairment | 23 (9.3%) | 3 (3.3%) |
| Digestive disease | 10 (4.0%) | 16 (17.8%) |
| Hyperlipidemia | 7 (2.8%) | 16 (17.8%) |
| Cardiopathy | 5 (2.0%) | 7 (7.8%) |
| Renal disease | 5 (2.0%) | 4 (4.4%) |
| Stroke | 4 (1.6%) | 9 (10.0%) |
| Chronic obstructive pulmonary disease | 1 (0.4%) | 3 (3.3%) |
| Others* | 23 (9.3%) | 10 (11.1%) |
| **Biochemistry (mean ± SD)** | | |
| Hemoglobin (g/dL) | 13.1±1.5 | 13.2±1.5 |
| Glycemia (mg/dL) | 112.8±42.4 | 111.5±31.0 |
| $HbA_{1c}$ (%) | 6.9±1.9 | 6.6±1.1 |
| Iron (µg/dL) | 69.1±26.5 | 75.6±28.3 |
| Ferritin (ng/dL) | 81.3±65.7 | 79.4±63.6 |
| Transferrin (mg/dL) | 274.1±55.5 | 276.9±49.4 |
| Vitamin $B_{12}$ (pg/dL) | 427.2±277.9 | 435.7±282.2 |
| Folic acid (ng/mL) | 12.1±12.4 | 12.1±12.3 |
| Total proteins (g/dL) | 6.9±0.6 | 7.1±0.6 |
| Albumin (g/dL) | 4.5±3.9 | 5.3±3.1 |
| TSH (ng/dL) | 3.1±2.1 | 3.1±2.2 |
| Cholesterol (mg/dL) | 202.2±40.8 | 208.9±47.5 |
| Triglycerides (mg/dL) | 124.2±71.3 | 122.7±57.3 |
| Uric acid (mg/dL) | 5.2±1.6 | 5.1±1.2 |
| Creatinine (mg/dL) | 1.1±0.6 | 0.9±0.4 |

SD: Standard deviation; TSH: Thyroid stimulating hormone, $HbA_{1c}$ : Hemoglobin A1c, M: Male, F: Female, n: Number of the patients
*Others: Other diseases with a prevalence <0.4%

| Table 2. Functional evaluation tests (falls vs no falls) and bivariate analysis | | | | |
|---|---|---|---|---|
| **Baseline phase: functional evaluation tests** | | | | |
| **Tests** | **Total (n=247)** | **Falls (n=182)** | **No falls (n=65)** | **p value** |
| **Lobo test, mean ± SD, points** | 27.2±9.3 | 27.7±8.6 | 25.1±11.5 | 0.012 |
| **Barthel test, mean ± SD, points** | 80.8±29.3 | 83.7±26.8 | 72.3±34.3 | 0.008 |
| **Lawton-Brody, mean ± SD, points** | 5.8±2.6 | 5.9±2.6 | 5.4±2.6 | 0.279 |
| **TUG test, mean ± SD, seconds** | 15.2±8.6 | 15.4±9.1 | 14.0±5.2 | 0.457 |
| **Bivariate analyses** | | | | |
| **Variables** | | **Falls (n=182)** | **No falls (n=65)** | **p value** |
| **Age, mean ± SD, years** | | 88.9±3.4 | 89.9±4.3 | 0.069 |
| **Gender, Male (n, %)** | | 54 (29.7%) | 22 (33.8%) | 0.535 |
| **Comorbidities** | | | | |
| Hypertension (n, %) | | 95 (52.2%) | 33 (50.8%) | 0.886 |
| Diabetes mellitus (n, %) | | 36 (19.8%) | 15 (23.1%) | 0.594 |
| Rheumatological diseases (n, %) | | 50 (27.5%) | 11 (16.9%) | 0.097 |
| Cognitive impairment (n, %) | | 18 (9.9%) | 5 (7.7%) | 0.804 |
| **Functional evaluation tests** | | | | |
| Lobo test (points) | | 27.7±8.6 | 25.1±11.5 | 0.012 |
| Lawton-Brody tests (points) | | 5.9±2.6 | 5.4±2.6 | 0.279 |
| Barthel test (points) | | 83.7±26.8 | 72.3±34.3 | 0.008 |
| TUG (seconds) | | 15.4±9.1 | 14.0±9.2 | 0.457 |
| Hemoglobin (g/dL) | | 13.2±1.6 | 12.7±1.5 | 0.029 |
| **Final phase: functional evaluation tests** | | | | |
| **Tests** | **Total (n=90)** | **Falls (n=23)** | **No falls (n=67)** | **p value** |
| **Lobo test, mean ± SD, points** | | | | |
| **Initial** | 30.8±4.3 | 30.8±4.0 | 30.7±4.5 | 0.243 |
| **Final** | 24.9±7.4 | 21.6±8.7 | 25.9±6.6 | 0.016 |
| **Barthel test, mean ± SD, points** | | | | |
| **Initial** | 92.8±13.8 | 92.0±14.5 | 93.1±13.6 | 0.967 |
| **Final** | 77.7±27.9 | 63.9±33.1 | 81.4±22.6 | 0.006 |
| **Lawton-Brody test, mean ± SD, points** | | | | |
| **Initial** | 6.7±1.9 | 7.1±1.5 | 6.6±2.0 | 0.184 |
| **Final** | 5.0±2.8 | 4.5±3.1 | 5.1±2.5 | 0.318 |
| **TUG test, mean ± SD, seconds** | | | | |
| **Initial** | 14.4±6.9 | 14.9±7.8 | 14.3±6.8 | 0.912 |
| **Final** | 24.3±10.2 | 27.0±12.0 | 23.5±9.3 | 0.154 |
| **Bivariate analyses** | | | | |
| **Variables** | | **Falls (n=23)** | **No falls (n=67)** | **p value** |
| **Age, mean ± SD, years** | | 88.7±2.6 | 88.1±2.7 | 0.320 |
| **Gender, Male (n, %)** | | 6 (26.1%) | 10 (14.9%) | 0.342 |
| **Comorbidities** | | | | |
| Hypertension (n, %) | | 10 (23.8%) | 32 (76.2%) | 0.811 |
| Diabetes mellitus (n, %) | | 6 (33.3%) | 12 (66.7%) | 0.384 |
| Rheumatological diseases (n, %) | | 7 (28.0%) | 18 (72%) | 0.790 |
| **Functional evaluation tests** | | Falls (n=23) | No falls (n=67) | p value |
| Lobo test | | 21.6±8.7 | 25.9±6.6 | 0.016 |
| Barthel test | | 63.9±33.1 | 81.4±22.6 | 0.006 |
| Lawton-Brody test | | 4.5±3.1 | 5.1±2.5 | 0.318 |
| TUG test | | 27.0±12.0 | 23.5±9.3 | 0.154 |
| Hemoglobin (g/dL) | | 13.5±1.4 | 13.1±1.6 | 0.387 |

*SD: Standard deviation, TUG: Timed up and go test




**Area Under the Curve (AUC)**

| Area | Typical error | Asymptotic significance | 95% Asymptotic CI | |
|---|---|---|---|---|
| | | | Lower limit | Upper limit |
| 0.555 | 0.80 | 0.432 | 0.398 | 0.713 |

CI: Confidence Interval

| | No falls (n=67) | Falls (n=23) | p value |
|---|---|---|---|
| TUG ≥25 seconds (n, %) | 18 (26.9%) | 12 (52.2%) | 0.039 |

**Figure 1.** TUG test: ROC curve

*TUG: Timed and go test, ROC: Receiver operating characteristic*

the mean value of the fallers vs non-fallers (Table 2). A significant positive correlation between age and TUG was detected, whereas a negative correlation was found between age and Lobo, Lawton-Brody and Barthel tests, respectively (Table 3). Lobo, Lawton-Brody and Barthel tests correlated significantly with each other and negatively with TUG. Previous falls was significantly associated with a higher score in Lobo and Barthel tests as well as with a significantly higher concentration of hemoglobin (Table 2).

### In Between Phase

Between the two phases, 108 individuals (43.7% of the 247 subjects who participated in the initial phase) died; 24 (9.7%) changed residence, 17 (6.8%) were admitted in nursing homes and eight (3.2%) withdrew informed consent. Among the deceased, no primary or secondary-related disease associated with falls was detected. The causes of the deaths included: cardiovascular disease (n=32, 30.2%); cancer (n=25, 23.3%); cognitive disorder (n=17 individuals, 15.1%); cerebrovascular disease (n=13, 11.8%); respiratory disease (n=9, 7.7%); gastrointestinal disease (n=8, 7.3%); diabetes mellitus (n=3, 7.3%) and renal disease (n=1, 2.1%). The deceased were slightly older than the survivors; the proportion of males was higher; Lobo, Lawton-Brody and Barthel tests' scores were lower and had lower cholesterol concentrations. No significant differences were observed regarding the presence of previous falls or the

**Table 3. Correlation between age (initial phase), vitamin D concentration (final phase) and functional evaluation tests**

| Initial phase | | Age | Lobo test | Barthel test | Lawton test | TUG test |
|---|---|---|---|---|---|---|
| **Age** | R value<br>p value | 1<br>- | -0.190<br>0.008 | -0.207<br>0.001 | -0.282<br>0.000 | 0.306<br>0.000 |
| **Lobo test** | R value<br>p value | -0.190<br>0.008 | 1<br>- | 0.779<br>0.000 | 0.662<br>0.000 | -0.453<br>0.000 |
| **Barthel test** | R value<br>p value | -0.207<br>0.000 | 0.779<br>0.000 | 1<br>- | 0.768<br>0.000 | -0.576<br>0.000 |
| **Lawton test** | R value<br>p value | -0.282<br>0.000 | 0.662<br>0.000 | 0.768<br>0.000 | 1<br>- | -0.560<br>0.000 |
| **TUG test** | R value<br>p value | 0.306<br>0.000 | -0.453<br>0.000 | -0.576<br>0.000 | -0.560<br>0.000 | 1<br>- |
| **Final phase** | | **TUG test** | **Lobo test** | **Barthel test** | **Lawton test** | **Vitamin D** |
| **TUG test** | R value<br>p value | 1<br>- | -0.474<br>0.000 | -0.758<br>0.000 | -0.758<br>0.000 | -0.259<br>0.014 |
| **Lobo test** | R value<br>p value | -0.474<br>0.000 | 1<br>- | 0.660<br>0.000 | 0.683<br>0.000 | 0.262<br>0.013 |
| **Barthel test** | R value<br>p value | -0.758<br>0.000 | 0.660<br>0.000 | 1<br>- | 0.768<br>0.000 | 0.281<br>0.007 |
| **Lawton test** | R value<br>p value | -0.758<br>0.000 | 0.683<br>0.000 | 0.768<br>0.000 | 1<br>- | 0.245<br>0.020 |
| **Vitamin D** | R value<br>p value | -0.259<br>0.014 | 0.262<br>0.013 | 0.281<br>0.007 | 0.245<br>0.020 | 1<br>- |

TUG: Timed up and go test

time in seconds spent in completing the TUG test between the two groups. In the multivariate analysis, the factors that were independently associated with mortality were male gender (p=0.016) and Lobo test score (p=0.002), respectively (data not shown).

### Final Phase

A total of 90 patients were enrolled in the final phase (Table 1). When compared to the initial phase, no statistically significant differences were observed with regards to demographic and biochemistry values. In addition, no significant differences were observed with regards to biochemistry values between fallers and non-fallers during the final phase. With regards to comorbidities, hypertension, diabetes and rheumatological diseases were the most prevalent. The presence of falls was not significantly higher in individuals who presented some of the most frequent comorbidities (data not shown).

With regards to functional evaluation tests, there was a significantly lower score on Lobo and Barthel tests among fallers vs non-fallers (Table 2). As for TUG test, when individuals were grouped according to the time required to conduct the test, and using the cut-off point of 25 seconds, it was observed that the frequency of falls was significantly higher in those that required longer time to conduct the test (p=0.039). The TUG cut-off value of 25 seconds had a sensitivity of 0.522 and a specificity of 0.746, respectively (Figure 1).

With regards to drug treatments, the mean number of drugs used was 6±4 (range=0-19). No statistically significant differences were observed between fallers and non-fallers as to type or number of treatments received (falls: mean treatments: 7.2±3.6 vs no falls: 5.8±3.4, p=0.109).

### Functional Evaluation Tests and Vitamin D

Forty-seven (52.2%) individuals had low level vitamin D concentrations (<20 ng/dL) during the final phase. A positive significant correlation between the serum concentration of vitamin D and the scores obtained in the Lobo, Lawton-Brody and Barthel tests and a negative correlation with the time in seconds required to complete the TUG test was observed (Table 3).

### Initial Vs Final Phase

### Falls

Only 14 individuals (15.5%) did not refer any fall during any of the two phases of the study. A total of 53 (79.1%) individuals that experienced falls during the baseline phase of the study did not experience any fall during the final phase of the study. Only five individuals (21.1%) reported falls during both study phases. The factors associated with the absence of recurrence of falls in those who had previously presented them compared to those who had a fall recurrence were analyzed. For that, the following variables were compared: age, gender, comorbidities, functional evaluation tests' scores and biochemistry determinations. No statistically significant differences were observed between the two groups with regards to any of the above parameters (data not shown).

### Functional Evaluation Tests

The mean values for the initial phase and final phase tests are shown in Table 4, detailing the data globally as well as in the two groups (individuals with and without falls in this final phase). The differences observed in each of the groups (with or without falls), except for TUG, were statistical significant. Both in the global group and in the two subgroups of individuals, during the four years between assessments, a significant deterioration occurred in each of the tests analyzed (Table 2).

### Multivariate Analysis of Risk Factors for Falls

The only variable significantly associated with a risk of falls was Barthel test score (p=0.006).

## Discussion

The present study analyzed the prognostic factors of falls in seniors. The population studied was older and included more women compared to previous studies (22,23). The frequency of falls was higher during the initial phase compared to the final phase. In addition, the frequency of falls observed during the final phase was significantly inferior to that reported by Rodriguez Molinero et al. (6) in a previous study conducted in Spain (50%). It could be assumed that the subjects participating

**Table 4. Initial vs final phase: differences in the scores of Lobo, Lawton-Brody, Barthel and TUG tests related to the presence or absence of falls**

| Differences between initial and final scores | Global (n=90) Mean ± SD | No falls (n=67) Mean ± SD | Falls (n=23) Mean ± SD | p value (no falls vs falls) |
|---|---|---|---|---|
| **Lobo test** | -6.0±6.7 | -4.9±5.7 | -9.2±8.2 | 0.007 |
| **Barthel test** | -15.8±23.4 | -11.6±18.5 | -28.0±31.2 | 0.003 |
| **Lawton test** | -1.8±2.2 | -1.4±2.1 | -2.7±2.5 | 0.018 |
| **TUG test** | 9.9±8.8 | 9.2±8.4 | 12.1±9.6 | 0.208 |

TUG: Timed up and go test, SD: Standard deviation

in the final phase represent a subgroup of individuals with better functional status or they protected themselves better after having experienced prior falls.

Baseline comorbidities included hypertension, diabetes mellitus and rheumatic diseases. However, unlike in other studies, their presence was not associated with an increased risk of falls in any of the two phases studied, nor there was a significant increase in the risk of falls associated with the use of drug treatments that favor their appearance (4,24,25). The analytical profile of the participants was within normal range. Different alterations may have been associated with falls; however, no meaningful association was found. In addition, low vitamin D concentration was not associated with a higher risk of falls, although more than 50% of the participants showed a vitamin D deficit. The efficacy of vitamin D supplements to reduce risk of falls in individuals with low vitamin D levels has been previously shown (26). It is possible, as Bromfield et al. (27) argues, that it is not the underlying diseases or the treatment itself but the existence of a fragility criterion.

In the initial phase of the study, the parameters that were significantly associated with the presence of falls were a higher concentration of hemoglobin and a higher score in Lobo and Barthel tests. These findings are seemingly paradoxical. It could be justified given that those patients who have a cognitive deterioration or less capacity for the basic activities of the daily life or a certain degree of anemia move less, and therefore require greater care, thus reducing therefore the risk of fall. One aspect to emphasize is the analysis of the evolution during the in between phases period. While no significant analytical modifications were observed, however, a significant deterioration of the cognitive, functional and TUG tests was detected. This scenario has been previously described by several authors, who explain the worsening of the functional evaluation tests with the "limited time mechanism" theory, that is, the decrease in the speed with which cognitive processing operations can be executed influences the functionality or autonomy for the basic and instrumental activities of daily life (28-30).

Finally, the different parameters, including the presence of falls, present in the initial phase on the mortality occurring between the two periods were analyzed. Mortality during the four years between the two phases was 43.7%, being the causes of the death expected in this age group (cardio-or brain-vascular disease, neoplasms and dementias). The factors associated with greater mortality were male gender and a lower score in the Lobo test, confirming the results of previous studies (31-34). In the present study the causes of death were mainly vascular diseases and neoplasms, and therefore, there is no clear explanation that justifies the relationship previously mentioned.

The results in the final phase of the study showed a significantly higher incidence of falls associated with a lower score of the Lobo and Barthel tests, as well as with the differences in the scores in Lobo, Barthel and Lawton-Brody tests reported between the initial and final phases. It can therefore be concluded that in real life the cognitive and functional tests are the ones associated with the risk of falls in senior population and not so much the comorbidities, treatments received or analytical alterations. Several studies confirm that cognitive impairment, associated with an altered result in the Lobo test, and functional dependency, measured by the Barthel and Lawton-Brody tests, are key predisposing factors for the emergence of falls (35,36).

One of the specific aims of the present study was to establish a cut off value of TUG that would identify the population with a greater risk of fall. In the initial phase of the study, the time to perform the TUG test did not differentiate those individuals who fell from those who did not. Only in the final phase a TUG cut off value of 25 seconds, that differentiated those who fell from those who did not, was established. The cut off value ranged from 12 to 16 seconds in prior studies (37,38). The results of the TUG test showed a negative correlation with Lobo, Barthel and Lawton-Brody tests. While the correlation with the latter two was as expected (lower speed in exercise, less capacity for instrumental and even basic activities of daily life), the relationship with Lobo test was less obvious. However, there are studies in the literature that analyzed the relationship between these parameters and have shown that, at least partially, alterations in cognitive tests are correlated with alterations in the speed or variability of gait (39,40).

### Study Limitations

There are some limitations that should be mentioned. First, the number of patients that participated in the final phase is small (90 patients), that is, 36% of the initial sample, but it is also important to highlight that, none of the deaths during the in-between period (108 patients, 48%), were due to complications related to a fall. Second, the results might have been affected by recall bias (fall history was obtained using a questionnaire) as well as selection bias (participants may have had a stronger interest in learning about their risk of fall compared to their peers who did not choose to participate). In addition, all subjects were recruited from a single independent living community in the Southern region of Spain, so it may be difficult to generalize our results to older adults with different characteristics or from other countries.

## Conclusion

It can be concluded that the predictive factors of falls in individuals >80 years of age are mainly those that evaluate cognitive ability and functional activities. Moreover, the

evaluation of the cognitive status by a simple test like the Lobo test contributes to evaluate their vital prognoses.

### Ethics

**Ethics Committee Approval:** The study was conducted in Unidad de Gestión Clínica "La Laguna", Cádiz, Spain and was approved by the relevant health authorities and ethic committees (approval number: CA'80©)

**Informed Consent:** Informed consent was obtained.

**Peer-review:** Externally peer-reviewed.

### Authorship Contributions

Concept: J.B., J.M.I., S.P., J.A.G., Design: J.B., J.M.I., S.P., J.A.G., Data Collection or Processing: J.B., J.M.I., S.P., J.A.G., Analysis or Interpretation: J.B., J.M.I., S.P., J.A.G., Literature Search: J.B., J.M.I., S.P., J.A.G., Writing: J.B., J.M.I., S.P., J.A.G.

**Conflict of Interest:** No conflict of interest was declared by the authors.

**Financial Disclosure:** The authors declared that this study received no financial support.

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ORIGINAL RESEARCH

**DOI:** 10.4274/ejgg.galenos.2019.214
Eur J Geriatr Gerontol 2019;1(3):87-93

# Delirium and Associated Factors Among Older Patients in Coronary and Internal Medicine Intensive Care Units of a University Hospital

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## Abstract

**Objective:** Delirium in intensive care units (ICUs) is associated with increased mortality, cognitive decline, prolonged hospitalization and increased likelihood of discharge to nursing home. Therefore, we aimed to evaluate its prevalence and the associated risk factors in two ICUs.

**Materials and Methods:** In this cohort study, delirium frequency was evaluated among 100 patients aged 65 and over in the internal medicine and coronary ICUs of Süleyman Demirel University Faculty of Medicine using the confusion assessment method and daily evaluations during May-June 2015. Cognitive and functional evaluations were performed and socio-demographic and clinical characteristics were recorded.

**Results:** Overall, delirium prevalence was 15% and it was more common in the internal medicine ICU compared to coronary ICU (52% vs 2.7%). In univariate analysis, age and Charlson comorbidity index and eight-item "Informant Interview to Differentiate Aging and Dementia" (AD8) scores were higher and Barthel activities of daily living index, Lawton-Brody instrumental activities of daily living scale and mini-mental state examination scores were lower in delirious patients. In multivariate logistic regression analysis, Barthel index was the only independent predictor of delirium. Barthel, Lawton-Brody, mini-mental state examination and AD8 scores were different among patients in the internal medicine ICU and those in coronary ICU.

**Conclusion:** Delirium and its risk factors were observed more frequently among internal medicine ICU patients. Moreover, activities of daily living score was the strongest predictor of delirium risk.

**Keywords:** Delirium, medical intensive care unit, coronary intensive care unit, activities of daily living, cognition

## Introduction

Delirium is an acute confusional state characterized by reduced ability to focus, sustain, or shift attention (1). According to the fifth edition of the "Diagnostic and Statistical Manual of the American Psychiatric Association" (DSM-V) (2), it is characterized by a disturbance in attention and awareness, disturbance that develops over a short period of time (usually hours to a few days), an additional disturbance in cognition, evidence from the history, physical examination or laboratory findings that the disturbance is a direct physiological consequence of another medical condition, substance intoxication or withdrawal or a medication side effect. Therefore, the diagnosis is established clinically with medical history and examination.

However, making delirium diagnosis in intensive care units (ICUs) using these criteria is time consuming and requires comprehensive education. "Confusion Assessment Method" (CAM) is a structured tool developed by Inouye et al. (3) in 1990 that enables to evaluate delirium symptoms stated in DSM-III-R. CAM has been determined to be the best test in terms of accuracy in a research comparing 11 bedside instruments to detect delirium presence (4). According to the meta-analysis by Wei et al. (5), sensitivity and specificity of CAM were 94% and 89%, respectively.

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**Received:** Oct 06, 2019 **Accepted:** Oct 28, 2019

**Cite this article as:** Aydın ZD, Yıldırım H. Delirium and Associated Factors Among Older Patients in Coronary and Internal Medicine Intensive Care Units of a University Hospital. Eur J Geriatr Gerontol 2019;1(3):87-93

Delirium occurs in 14% to 56% of elderly patients during hospitalization (6) and its prevalence is even higher in the ICU (7). In ICU, delirium is associated with increased mortality, increased cognitive decline, prolonged hospitalization and an increase in the likelihood of discharge to a nursing home (8). It is known that a day with delirium increases the hospitalization duration by 20% and mortality by 10% (9). Therefore, delirium diagnosis and treatment are very important in ICUs.

Predisposing and precipitant risk factors are in interaction in delirium development. Predisposing risk factors for delirium are the characteristics that the patient has at admission (10). Predisposing risk factors involve age (especially above 70 years), dementia, living in a nursing home, cigarette and alcohol use, illegal medication use, visual and hearing disorders, high urea-creatinine levels, history of stroke, epilepsy, congestive heart failure and depression. Precipitating factors arise as a consequence of noxious insults or hospital-related issues. Precipitant factors are infection, sepsis, hypoxia, metabolic disorders, electrolyte imbalance, malnutrition, hypo-hyperglycemia, hypo-hyperthyroidism, hypo-hypernatremia, dehydration, hemodynamic instability, cerebral and vascular disorders (such as hypertension), head trauma and seizures. In addition, some pharmacological agents are among the precipitant factors as well. Adding three or more medications to the treatment or abrupt withdrawal of continuously used medications in ICU patients may be triggering factors for delirium as well (11).

The importance of this subject is explicit as delirium is a clinical condition affecting important end points such as mortality and functional condition. Recognizing delirium and using appropriate approaches may affect the prognosis positively. In this study, we aimed to detect the delirium prevalence in patients aged 65 years and older hospitalized in coronary ICU (CICU) and medical ICU (MICU) using CAM and to analyze the associated factors.

## Materials and Methods

All patients aged 65 and older hospitalized in Süleyman Demirel University MICU (n=25) and CICU (n=75) between May 2015 and June 2015 were included in this cohort study. The study was approved by Süleyman Demirel University Faculty of Medicine Ethics Committee, and informed consent was obtained from the patients or their relatives (decision no: 202)

Data were collected with a questionnaire. All assessments were made by a single investigator who is an internist (HY). Data were collected directly from the patients (n=65) or from the relatives when the patient was unable to provide information (n=35). AD8 dementia screening was performed by interviewing the relatives/caregivers of the patients.

All assessments except CAM were performed only once at the time of initial admission to the ICU whereas CAM was performed daily. The one-time assessments included socio-demographic characteristics, clinical information, Charlson comorbidity index (CCI), Barthel activities of daily living (ADL) Index, Lawton-Brody instrumental ADL (IADL) scale and Mini-mental State Examination (MMSE); these assessments reflected the current condition of the patient.

The presence of delirium was assessed with CAM which evaluates delirium symptoms (3). Delirium is diagnosed when both acute onset/fluctuating course and inattention are present (features 1 and 2) and at least one of other two features (disorganized thinking or altered level of consciousness). Validity and reliability studies of the ICU form of this tool (CAM-ICU) have been performed by Akinci et al. (12) in 2005. Patients were evaluated daily (including the weekends) with CAM by one of the investigators (HY). If the patient meets the delirium criteria with CAM in at least one day, the patient was considered to have delirium.

The CCI consists of 19 selected conditions that are weighted and summed to an index on a 0-33 scale. CCI estimates mortality based on combined age-comorbidity score (13). Increased score is associated with increased mortality. The CCI is the most extensively studied comorbidity index and its validity has been studied in diverse patient groups (14). CCI also appears to be a valid instrument in predicting mortality and length of stay in critically ill elderly Turkish patients (15).

Barthel ADL index consists of 10 items of daily life activities and mobility. Nutrition, ability to transfer from wheelchair to bed and turn in bed, self-care, bath, walk, climb and descend a ladder, dress, and bladder and bowel continence are examined. A score is calculated according to whether the patient receives help during these activities or not. The highest score is 100 and it means that the individual is completely independent in physical activities. The lowest score is 0 and it means that the individual is completely dependent (16). The validity and reliability of the Turkish version of the Barthel ADL index was assesed by Küçükdeveci et al. (17) in patients with stroke and spinal cord injury.

Lawton-Brody IADL index examines eight instrumental daily life activities; using the phone, shopping, preparing food, laundering, house cleaning, using transportation, taking the responsibility for own medications and handling finances. A modified scoring of the Lawton-Brody IADL index was used by giving points between 0 and 3 to each activity with a total score of 24 points instead of assigning a score of 0 or 1 for each activity with a total score of 8 points in the original version (18). Individuals who perform activities independently take 3 points, those who get help during the activities take 1 or 2 points and those who cannot participate in the activity at all take 0 points. A greater score indicates greater ability to perform IADL.

AD8 dementia screening interview is an informant based short and sensitive measure which consists of eight items and discriminates the individuals with and without dementia in a valid and reliable manner. It shows equal reliability in both face to face and phone interviews (19). The informant (such as a spouse or caregiver) is asked to rate the patient according to eight questions pertaining to cognitive function (the AD8). Turkish validation-reliability study of AD8 had not been performed as of May 2015, when our study was conducted. We used a modified version of Dr. Cenk Akbostancı's translation of the questionnaire by courtesy of the authors. Recently Usarel et al. (20) published the validity and reliability assessment of AD8. Unfortunately, our study utilized an unvalidated translation. Nevertheless, a score of ≥2 is considered as a further evaluation criterion in terms of dementia (19). In our study, both total AD8 score and AD8 score of ≥2 have been examined in terms of their relation with delirium.

MMSE is the most commonly used cognitive test in clinical practice in USA (21). MMSE tests various cognitive functions such as orientation, memory, attention, calculation, language and visuospatial abilities. Maximum score in MMSE is 30. A score under 24 indicates an impairment in cognitive function. There are two versions of the MMSE test for educated and illiterate patients. The validation and reliability of MMSE test in mild dementia diagnosis in a Turkish population who attended school for at least five years was performed by Güngen et al. (22) in 2002. The validation and reliability study of MMSE for the illiterate was performed by Babacan-Yıldız et al. (23) in 2015.

### Statistics

Data was analyzed using SAS 9.4, $p<0.05$ was considered significant. In descriptive analyses, mean and standard deviations are presented for continuous variables with normal distribution, median (range) for continuous variables with non-normal distribution and number (n) and percentages (%) for the categorical variables. Characteristics were compared between the patients hospitalized in MICU and CICU and between the patients who developed and did not develop delirium.

In group comparisons (MICU vs CICU and the patients who developed delirium vs the ones who did not), "independent samples t-test" was performed for the continuous variables with normal distribution and "Mann-Whitney U test" for the continuous variables with non-normal distribution. Chi-square test was performed to compare the categorical data and proportions; Fisher exact test was performed when the lowest expected value in any cell of 2x2 crosstabs was below 5.

Multivariate logistic regression analysis was performed to determine the factors predicting the likelihood of experiencing delirium independently. All factors listed in tables 1-2 were taken into consideration when the multivariate model was established. A stepwise model selection algorithm was used with two obligatory variables (age and ICU) selected a priori and forced into the model. The stepwise approach was preferred because of the small sample size and large number of variables. The significance level for entering and staying in the model was 0.05.

## Results

Delirium prevalence was 15% in all patients in our research group, 52% in MICU and 2.7% in CICU using CAM.

Comparison of patient characteristics hospitalized in MICU (n=25) and CICU (n=75) are shown in Table 1. In one-by-one comparisons, MICU patients had higher CCI score and higher AD8 total score at admission and lower Barthel ADL score, lower Lawton-Brody IADL score and lower MMSE score at admission compared to those of CICU patients.

Comparison of patient characteristics for those who developed delirium (n=15) and who had not (n=85) are shown in Table 2. In one-by-one comparisons, the patients who developed delirium had higher age, higher CCI score and higher AD8 total score at admission and lower Barthel ADL score, lower Lawton-Brody IADL score and lower MMSE score at admission compared to the ones without delirium.

The multivariate logistic regression analysis is shown in Table 3 with the respective odds ratio, 95% confidence interval, and p values. Among the examined factors, only Barthel ADL index could predict delirium development independently. Increased Barthel score (i.e. better functional status) is associated with lower delirium risk (Odds ratio <1).

## Discussion

When CAM was used to determine the delirium prevalence, a significantly higher prevalence was detected in MICU (52%) compared to CICU (2.7%). In our study, the delirium prevalence detected in MICU was close to the rates reported in the literature. For instance; Limpawattana et al. (24) detected delirium in 44.4% of 99 patients aged >65 who were hospitalized in a Medical Faculty ICU in Thailand. We could not find any study comparing delirium prevalence in coronary and internal medicine ICUs in the literature. When different studies are evaluated, delirium prevalence seems to be lower than that of MICU in CICU studies, in parallel with our study (24,25). In addition, all CICU delirium rates we could find (16%-48%) seem higher than the rates observed in CICU in our study (2.7%) (25-27).

The reasons for the lower prevalence of delirium in our CICU is unclear at this point as we have not collected data on specific patient subpopulations or predisposing medical interventions. For instance, specific patient groups such as

patients with advanced heart failure, patients on mechanical ventricular support devices, patients treated by transcatheter aortic valve replacement and survivors of cardiac arrest present with increased complexity and are at increased risk of delirium in CICU (28). It is also possible that there may be a lower prevalence of interventions that predispose to delirium such as use of indwelling catheters in CICU. These factors remain to be explored in future studies. Nevertheless, it is observed that frequency of many characteristics known to be risk factors for delirium are different in MICU and CICU. CCI, Barthel ADL, Lawton-Brody IADL, MMSE and AD8 scores at admission are the most remarkable ones among these differences.

Number one cause of admission was coronary artery disease in CICU patients (82.7%) whereas number one cause of admission in MICU was sepsis and infection (28%) (Table 2). Studies on the causes of admission to MICU report also respiratory problems as a major cause. A MICU study has reported that 47.7% of 44 patients who developed delirium had pneumonia and other respiratory problems, 18.8% had sepsis, 11.3% had heart diseases (24). Similarly, sepsis was the most frequent cause of admission to our MICU, however, respiratory problems were less frequent and this is due to the lack of ventilation support in our MICU.

The most important and the only independent predictor for delirium in our study is the Barthel ADL score. When age, CCI, Lawton-Brody IADL score, MMSE score and AD8 total score at admission were examined individually, they were found to be associated with delirium presence, however, these factors were not significant in multivariate analysis. Our small sample size can explain the inability to detect some important relationships. Also, in hospitalized elderly Turkish patients, Barthel ADL score as well as IADL and MMSE scores were detected to be low in patients with delirium consistent with findings of our study (29).

In our study, mean age of patients with delirium was higher than that of patients without delirium. This result is consistent with the literature (24,25,29).

In our study group, CCI score of patients who developed delirium was higher compared to the ones without delirium and CCI score of patients in MICU was found to be higher than that of the patients in CICU. In other words, there are more patients with comorbid conditions in MICU and among those who had delirium. In the literature, CCI score of patients who developed delirium is higher than that of patients without delirium in keeping with our findings (30). This demonstrates that individuals with more concomitant comorbid diseases have more tendency to develop delirium.

**Table 1. Comparison of characteristics of patients hospitalized in MICU and CICU**

| Variable | | Total n=100 | MICU n=25 | CICU n=75 | p value |
|---|---|---|---|---|---|
| **Delirium** | Yes, n (%) | 15 (15%) | 13 (52%) | 2 (2.7%) | **<0.001** |
| | No, n (%) | 858 (85%) | 12 (48%) | 73 (97.3%) | |
| **Mean age ± SD** | | 75.9±7.3 | 78.1±7.8 | 75.1±7.1 | 0.073 |
| **Mean BMI ± SD** | | 27.2±5.1 | 26.8±6.0 | 27.3±4.9 | 0.665 |
| **Gender** | Female, n (%) | 45 (45%) | 13 (52%) | 32 (42.7%) | 0.417 |
| | Male, n (%) | 55 (55%) | 12 (71%) | 43 (57.3%) | |
| **Mean number of medications ± SD** | | 6.5±2.3 | 5.6±3.2 | 6.8±1.8 | 0.079 |
| **Mean CCI score ± SD** | | 5.3±1.9 | 6.2±2.1 | 5.0±1.7 | **0.005** |
| **Median Barthel ADL score (range)** | | 65 (0-100) | 20 (0-70) | 65 (15-100) | **<0.001** |
| **Median Lawton-Brody IADL score (range)** | | 7 (0-24) | 0 (0-13) | 8 (0-24) | **<0.001** |
| **Median MMSE score (range)** | | 23.5 (0-30) | 11 (0-30) | 25 (5-30) | **<0.001** |
| **Possible dementia (AD8≥2)** | Yes, n (%) | 66 (66%) | 20 (80%) | 46 (61.3%) | 0.088 |
| | No, n (%) | 34 (34%) | 5 (20%) | 29 (38.7%) | |
| **Median AD8 total score (range)** | | 4 (0-8) | 6 (0-8) | 3 (0-8) | **0.007** |
| **Living with whom** | With spouse, n (%) | 57 (57%) | 9 (36%) | 48 (64%) | **0.014** |
| | With relatives, n (%) | 27 (27%) | 13 (52%) | 14 (18.7%) | **0.001** |
| | Alone, n (%) | 15 (15%) | 3 (12%) | 12 (16%) | **0.755** |
| | With caregiver, n (%) | 1 (%1) | 0 (0%) | 1 (1.3%) | **1.000** |
| **Hospitalization due to sepsis and infection, n (%)** | | 7 (7%) | 7 (28%) | 0 (0%) | **<0.001** |
| **Hospitalization due to CAD, n (%)** | | 62 (62%) | 0 (0%) | 62 (82.7%) | **<0.001** |

BMI: Body mass index, CCI: Charlson Comorbidty index, ADL: Activities of daily living, IADL: Instrumental activities of daily living, MMSE: Mini-mental status examination, MICU: Medical intensive care unit, CICU: Coronary intensive care unit, CAD: Coronary artery disease, SD: Standard deviation

Although it is not statistically significant (p=0.067), there seems to be a higher proportion of patients with AD8 score ≥2 in the delirious group (86.7% vs 62.4%). On the other hand, total AD8 score was significantly higher in patients who developed delirium compared to those who had not (Table 2). Furthermore, MMSE score was lower in patients with delirium compared to the ones without delirium (6 vs 22). However, none of our cognitive assessment parameters were significant in multivariate analysis. Nevertheless, many studies in the literature show that dementia is a risk factor for delirium, and patients with delirium have higher rates of cognitive dysfunction and dementia. (7,24,29,30).

Another finding was that living with the spouse was significantly less prevalent in delirious patients whereas living with relatives was significantly more prevalent. Neither of the two factors was significant in multivariate analysis. It has been reported previously that being married is associated with better health and lower mortality (31) but increased delirium severity (32). Our findings suggest that living with the spouse may be protective against delirium. This may be an interesting topic for further research.

Mean number of medications at admission was not different among patients with and without delirium (6.6 vs 6.5) and this factor was not different among patients with and without delirium, when analyzed separately for patients in MICU and CICU (analysis not shown). Nevertheless, it is known that the number of medications and use of particular medications are risk factors for delirium development (24).

### Study Limitations

Our study diverges from other delirium prevalence studies in that it revealed the characteristics of geriatric patients in different ICUs simultaneously. Other strong aspects of our study are evaluation of delirium development not only during admission but also during the whole stay in ICU and interviews performed by a single interviewer in a standardized manner. There are several limitations of this study. First, this is an observational study and the associations can't be interpreted to infer causality. Though the study had a prospective cohort design, the data was recorded to yield prevalent but not incident delirium. In other words, we do not distinguish whether the patient was delirious on admission or it developed later on during their ICU stay. Because the study period covered only 2 months, the sample

**Table 2. Comparison of characteristics of patients with and without delirium**

| Variable | | Delirium (+) n=15 | Delirium (-) n=85 | p value |
|---|---|---|---|---|
| **Mean age ± SD** | | 79.6±8.4 | 75.2±7.0 | **0.030** |
| **Mean BMI ± SD** | | 26.2±6.4 | 27.3±4.9 | 0.441 |
| **Gender** | Female | 10 (66.7%) | 35 (41.2%) | 0.067 |
| | Male | 5 (33.3%) | 50 (58.8%) | |
| **Unit** | MICU, n (%) | 13 (86.7%) | 12 (14.1%) | **<0.001** |
| | CICU, n (%) | 2 (13.3%) | 73 (%85.9) | |
| **Mean number of medications ± SD** | | 6.6±2.8 | 6.5±2.2 | 0.842 |
| **Mean CCI score ± SD** | | 6.7±2.3 | 5.0±1.7 | **0.001** |
| **Median Barthel ADL score (range)** | | 0 (0-65) | 65 (0-100) | **<0.001** |
| **Median Lawton-Brody IADL score (range)** | | 0 (0-4) | 8 (0-19) | **<0.001** |
| **Median MMSE score (range)** | | 3 (0-25) | 24 (5-30) | **<0.001** |
| **Possible dementia (AD8 ≥2)** | Yes, n (%) | 13 (86.7%) | 53 (62.4%) | 0.067 |
| | No, n (%) | 2 (13.3%) | 32 (37.6%) | |
| **Median AD8 total score (range)** | | 7 (0-8) | 3 (0-8) | **0.001** |
| **Living with whom** | With spouse, n (%) | 4 (26.7%) | 53 (62.4%) | **0.010** |
| | With relatives, n (%) | 8 (53.3%) | 19 (22.4%) | **0.024** |
| | Alone, n (%) | 3 (20%) | 12 (14.1%) | **0.694** |
| | With caregiver, n (%) | 0 (0%) | 1 (%1.2) | **1.000** |
| **Hospitalization due to sepsis and infection** | Yes, n (%) | 6 | 1 | **<0.001** |
| | No, n (%) | 9 | 84 | |
| **Hospitalization due to CAD** | Yes, n (%) | 2 | 60 | **<0.001** |
| | No, n (%) | 13 | 25 | |

BMI: Body mass index, CCI: Charlson Comorbidty index, ADL: Activities of daily living, IADL: Instrumental activities of daily living, MMSE: Mini mental status examination, MICU: Medical intensive care unit, CICU: Coronary intensive care unit, CAD: Coronary artery disease, SD: Standard deviation

**Table 3. Predictors of Delirium Risk-multivariate Logistic Regression Analysis (n=100)**

| Risk Factor | p value | OR (95% CI Lower-Upper Limit) |
|---|---|---|
| **Age** | 0.867 | 0.99 (0.86-1.14) |
| **Service/Unit (CICU)** | 0.647 | 0.56 (0.05-6.78) |
| **Barthel ADL score** | <0.001 | 0.91 (0.86-0.96) |

ADL: Activities of daily living, CICU: Coronary intensive care unit, OR: Odds ratio, CI: Confidence interval

size is small. Another limitation is that some assessment tools we used have not been validated in the Turkish population (i.e. Lawton-Brody IADL index) and some have been validated only after our study have been conducted (i.e. AD8) (20).

## Conclusion

Delirium rate is higher in MICU compared to CICU of a university hospital as expected (52% vs 2.7%). It is also seen that many risk factors associated with delirium are more common in MICU compared to CICU. Although factors such as age, CCI score, Barthel ADL score, Lawton-Brody IADL score, MMSE score and total AD8 score are different among patients with and without delirium, ADL score is the only independent predictor of delirium. Larger studies will be helpful in determining the risk factors in more detail. Nevertheless, a thorough follow-up of patients especially with restricted ADL in ICUs can be useful in early recognition of delirium which confers a high risk of mortality and morbidity.

### Acknowledgement

We would like to thank Dr. Serdar Yıldırım (Department of Public Health, Süleyman Demirel University Faculty of Medicine) for his assistance in statistical analysis.

### Ethics

**Ethics Committee Approval:** The study was approved by Süleyman Demirel University Faculty of Medicine Ethics Committee, and informed consent was obtained from the patients or their relatives (decision no: 202).

**Informed Consent:** Informed consent was obtained from the patients or their relatives.

**Peer-review:** Externally and internally peer-reviewed.

### Authorship Contributions

Concept: Z.D.A., H.Y., Design: Z.D.A., H.Y., Data Collection or Processing: Z.D.A., H.Y., Analysis or Interpretation: Z.D.A., H.Y., Literature Search: Z.D.A., H.Y., Writing: Z.D.A., H.Y.

**Conflict of Interest:** No conflict of interest was declared by the authors.

**Financial Disclosure:** The authors declared that this study received no financial support.

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ORIGINAL RESEARCH

**DOI:** 10.4274/ejgg.galenos.2019.146
Eur J Geriatr Gerontol 2019;1(3):94-100

# The Physicians' Attitudes and Barriers to Proactive Sexual History Taking During Comprehensive Geriatric Assessment

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## Abstract

**Objective:** The purpose of this study was to assess the geriatricians' attitudes and perceived barriers to proactive sexual history taking during comprehensive geriatric assessment (CGA).

**Materials and Methods:** A self-administrated survey was delivered to 150 geriatricians in Cairo, Egypt. Fifty-six were returned (response rate=37.33%). The demographic data, attitudes, and barriers to discussing sexuality were probed.

**Results:** All the participants thought that sexual history should be taken during the first office visit as a part of the CGA process, however, 13 (23.2%) participants have never obtained a sexual history and 43 (76.78%) obtained it out of necessity. None of the respondents obtained sexual history on a routine basis. The reported barriers included fear of the patients' impressions, presence of major comorbid health problems, and lack of privacy during interview. The physicians' gender and marital status did not affect their attitudes towards proactive sexual history. However, the patients' educational level and social status can affect physicians' attitudes towards sexual history.

**Conclusion:** This study highlights both the lack of proactive sexual history taking and the main related barriers in geriatric practice in Egypt.

**Keywords:** Culturally competent care, geriatric assessment, geriatricians, health services for the aged, sexual health

## Introduction

Sexuality is an integral aspect of emotional and physical wellbeing across lifespan. For older adults, it is an important contributing factor to the quality of life and successful ageing (1). Yet, it remains a neglected issue by both the patient and the physician during health assessment (2,3).

Against the popular belief that older adults lack sexual desires or that they are physically unable to perform (2), many adults remain sexually active into later life (3), even though many age related physiological changes, comorbid medical disorders, medications, and psychosocial factors might interfere with the sexual performance among older patients (4).

Yet, sexual problems are common among both elderly men and women. The prevalence of sexual dysfunction in men and women aged 40-80 years, across 29 countries was 28% and 39%, respectively (5).

In Egypt, men with moderate erectile dysfunction (ED) comprised 10.3% and those with complete ED were 13.2%. Twenty-six percent of men with complete ED were in their 50s, 49% of them in their 60s and 52% were 70 years or older (6). Data regarding sexual dysfunction in elderly Egyptian women is lacking.

In order to early detect and intervene with sexual problems, the sexual history taking is becoming an indispensable part of the comprehensive geriatric assessment (CGA). However, many geriatricians feel uncomfortable to incorporate sexual history into patient assessment (7). In the United States, only 38% of men and 22% of women had discussed sex with a physician since age 50 (8).

Several obstacles can make sexual history taking a challenge for clinicians. These obstacles include clinician, patient, and setting related barriers (9). One of the most important physician related barrier to sexual history taking is the inadequate or insufficient

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**Received:** Sep 02, 2019 **Accepted:** Nov 26, 2019

**Cite this article as:** Rasheedy D, Mortada M. The Physicians' Attitudes and Barriers to Proactive Sexual History Taking During Comprehensive Geriatric Assessment. Eur J Geriatr Gerontol 2019;1(3):94-100

training in sexual health (10). The embarrassment, fear of being insensitive and cultural issues may also hamper proactive sexual history (11).

The attitudes of geriatricians towards discussing sexuality in Egypt may be affected by cultural sensitivity, but other administrative barriers should not be underestimated e.g. inadequate training, time restraint or privacy issues.

The aim of this study was to assess the Egyptian geriatricians' attitudes and barriers to taking a proactive sexual history in clinical practice.

## Materials and Methods

The study methodology was reviewed and approved by the Research Review Board of the Ain Shams University Faculty of Medicine, Department of Geriatrics and Gerontology (GG-ASU-2019/18a).

Fifty-six geriatricians (consultants, specialists, and registrars) responded to a self-administered closed-question survey related to sexual history taking during the CGA. The participants were included in the study as a convenience-based sample of geriatricians in Egypt. The total number of geriatricians registered in the Egyptian medical syndicate is 150 with about (30) 20% of them working abroad, 12 working in the ministry of health, and the rest are working in university hospitals.

The survey was distributed through online form and through hand-to-hand approach. Those hand-delivered were placed in an opaque envelope to ensure anonymity.

The authors created the questions based on previous researches related to this issue. Part I recorded personal information. The participants were asked about their age, gender, years of experience, marital status, and if they consider themselves as conservative persons. Part II recorded the attitudes and barriers to obtaining sexual history during CGA.

The participants were asked if they routinely took a sexual history and the reasons, if any, for not obtaining it routinely from elderly patients e.g. lack of time during office assessment, lack of training, embarrassment, or not knowing how to manage patients' concerns. Moreover, the respondents opinion whether sexual history taking should become a routine practice during CGA was obtained (Appendix 1).

### Statistics

The collected data were coded, tabulated, revised and statistical analyzed using SPSS program-version 16 (SPSS Inc., Chicago, IL, USA). Data were analyzed using counts and proportions. The qualitative variables were compared by using the chi-square test. Independent samples t-tests were used to explore gender differences in mean age. ANOVA test was used to compare age between different staff categories. A p value less than 0.05 was considered statistically significant. Regression analysis for predictors of never taking a sexual history was performed.

## Results

In total, 56 of the 150 Egyptian geriatricians responded to the survey with a response rate of 37.33%, 15 (26.8%) were males and 41 (73.2%) were females. They included 15 (26.8%) registrars, 17 (30.4%) specialists and 24 (42.9%) consultants. Their mean age was 26.26±0.96, 30.7±3.15, 40.45±3.48 years, respectively ($p<0.0001$) (Table 1).

Many of the participants worked in public hospitals. Although, all the participants thought that sexual history should be taken during the first office visit as a part of CGA, none of them routinely did so (Table 1).

Eighteen (32.14%) of the geriatricians obtained sexual history only when the patient had a certain sexual issue, 30 (53.71%) of them obtained sexual history when the patient had a related health problem, and 13 (23.2%) of them have never obtained a sexual history (Table 1).

Surprisingly, eighteen (32.14%) of our sample thought that sexual problems were uncommon among older adults, and 19 (33.95%) reported that older adults are not sexually active. Only one third of our sample considered themselves properly trained to address sexual issues. None of the registrars considered themselves adequately trained to address sexual concerns. Only 27% of the respondents reported that their supervisors encouraged them to obtain proactive sexual history (Table 1).

The most common reported barriers to proactive sexual history taking were the fear of the patients' impression, the presence of major comorbid health problems, and the lack of privacy during the interview in 76.8%, 71.4%, and 71.4% of the responses, respectively (Table 1).

Despite being more trained, more consultants viewed low education and low social class as major obstacles for taking sexual history during CGA (Table 1). Likewise, female geriatricians reported more difficulties when addressing sexual problems in patients with low education or low social class compared to males. Otherwise, there was no gender difference in other perceived barriers (Table 2).

Using a regression analysis, being a registrar and the underestimation of sexual problem among older adults were the independent predictors for never obtaining a sexual history during CGA (Table 3).

## Discussion

In Egypt, while elderly patients seek treatment for a variety of health related problems, they remain very hesitant when

**Appendix 1: The questionnaire form applied to the participants**

Demographic data:

- Age
- Gender: Male ☐ Female ☐
- Marital status Married ☐ Single ☐ Divorced ☐
- Place of practice Urban ☐ Rural ☐

Private sector ☐ Public sector ☐

- Current position Registrar ☐ Specialist ☐ Consultant ☐
- Do you consider yourself conservative Yes ☐ No ☐

**When performing a comprehensive geriatric assessment:**

- When do you obtain sexual history:

o As a routine

o I obtain sexual history, only if there was a presumed association of Sexual History with Current Health Problems.

o Only if the patient enquires about a certain concern

o Never obtained sexual history from my patients

- Do you think sexual problems are common among elderly patients?
- Do you think that you have enough information about sexual health in older adults?
- Did you receive adequate training to comprehensively address sexual concerns?
- Do your supervisors recommend you to take sexual history from your elderly patients?
- Do you think sexual history taking should be routine practice during CGA?
- Do you think elderly patients are less sexually active?

**Why don't you routinely obtain sexual history? (the barriers)**

1. I don't have enough time during the daily practice Yes ☐ No ☐
2. I don't consider it appropriate Yes ☐ No ☐
3. I think my patient may consider it inappropriate Yes ☐ No ☐
4. I think elderly patients have little interest in sexuality Yes ☐ No ☐
5. I think elderly patients have major health concerns that is more important than sexuality

Yes ☐ No ☐ .

6. I think lack of privacy during interview interferes with sexual history taking Yes ☐ No ☐
7. I am concerned about not being able to cope with the issues raised Yes ☐ No ☐

**In your opinion, which of the previously mentioned barriers prevented you to routinely obtain sexual history?**

**1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐**

**Do you find it more difficult to obtain sexual history from patients of opposite gender? Yes ☐ No ☐**

**Do you find it more difficult to obtain sexual history from patients of low educational level? Yes ☐ No ☐**

**Do you find it more difficult to obtain sexual history from patients of low social status? Yes ☐ No ☐**

**Table 1. Demographic data and barriers in different geriatric practitioners' categories**

| Variables | | The practitioners' categories | | | |
|---|---|---|---|---|---|
| | | Registrars 15 (26.8%) | Specialists 17 (30.4%) | Consultants 24 (42.9%) | p |
| Age in years (mean ± SD) | | 26.3±0.9 | 30.7±3.2 | 40.5±3.5 | <0.001* |
| Gender, n (%) | Male | 3 (20.0%) | 8 (47.1%) | 4 (16.7%) | 0.075 |
| | Female | 12 (80.0%) | 9 (52.9%) | 20 (83.3%) | - |
| Clinical practice, n (%) | Public | 14 (93.3%) | 8 (47.1%) | 15 (62.5%) | 0.026* |
| | Private | 0 | 2 (11.8%) | 0 | - |
| | Both | 1 (6.7%) | 7 (41.2%) | 9 (37.5%) | - |
| Marital status, n (%) | Married | 4 (26.7%) | 10 (58.8%) | 20 (83.3%) | 0.004* |
| | Single | 11 (73.3%) | 7 (41.2%) | 3 (12.5%) | - |
| | Divorced | 0 | 0 | 1 (4.2%) | - |
| Physicians who considered themselves conservative, n (%) | | 12 (80.0%) | 12 (70.6%) | 20 (83.3%) | 0.611 |
| Physicians who have never took sexual history, n (%) | | 6 (40.0%) | 3 (17.7%) | 4 (16.7%) | 0.198 |
| Physicians who obtained sexual history, only if there was a presumed association of sexual History with Current Health Problems, n (%) | | 9 (60.0%) | 12 (70.6%) | 9 (37.5%) | 0.094 |
| Physicians obtained sexual history, only if the patient enquires about a certain concern, n (%) | | 2 (13.3%) | 3 (17.7%) | 13 (54.2%) | 0.009* |
| Physicians who thought sexual problems are not common in older adults, n (%) | | 5 (33.3%) | 6 (35.3%) | 7 (29.2%) | 0.912 |
| Physicians who thought older adults are not sexually active, n (%) | | 7 (46.7%) | 8 (47.1%) | 4 (16.7%) | 0.061 |
| Physicians who received adequate training to address sexual concerns, n (%) | | 0 | 5 (29.4%) | 12 (50.0%) | 0.004* |
| Physicians who were recommended to obtain sexual history during CGA by their supervisors, n (%) | | 5 (33.3%) | 5 (29.4%) | 5 (20.8%) | 0.663 |
| Physicians who thought sexual history taking should be a routine practice during CGA, n (%) | | 15 (100.0%) | 17 (100.0%) | 24 (100.0%) | - |
| Causes for not taking a sexual history from physicians' perspectives (more than one cause can apply) | | | | | |
| The Lack of adequate time during the daily practice, n (%) | | 7 (46.7%) | 10 (58.8%) | 9 (37.5%) | 0.403 |
| Considering sexual history inappropriate, n (%) | | 8 (53.3%) | 3 (17.7%) | 7 (29.2%) | 0.090 |
| Patient may be offended, n (%) | | 13 (86.7%) | 12 (70.6%) | 18 (75.0%) | 0.540 |
| Older adults patients have little interest in sexuality, n (%) | | 8 (53.3%) | 7 (41.2%) | 6 (25.0%) | 0.192 |
| Older patients have major health concerns that is more important than sexuality, n (%) | | 8 (53.3%) | 12 (70.6%) | 20 (83.3%) | 0.130 |
| Lack of privacy during the interview, n (%) | | 10 (66.7%) | 13(76.5%) | 17 (70.8%) | 0.826 |
| Inability to manage sexual problems, n (%) | | 13 (86.7%) | 12 (70.6%) | 15 (62.5%) | 0.266 |
| Obtaining sexual history from patients of opposite gender is rather difficult, n (%) | | 9 (60.0%) | 12 (70.6%) | 19 (79.2%) | 0.434 |
| Obtaining sexual history from patients of low educational level is rather difficult, n (%) | | 8 (53.3%) | 8 (47.0%) | 22 (91.7%) | 0.004* |
| Obtaining sexual history from patients of low social status is rather difficult, n (%) | | 7 (46.7%) | 8 (47.0%) | 19 (79.2%) | 0.050* |

n: number, SD: Standard deviation, CGA: Comprehensive geriatric assessment
*p<0.05: Statistical significance

seeking medical help for a sexual problem. This may be due to embarrassment or perceiving sexual problems as normal part of ageing process. Thus, it is mandatory for geriatricians to become proactive when approaching sexual issues with their patients.

Unfortunately, many geriatricians feel ill at ease to take sexual history during heath assessment; many factors might contribute to this discomfort (7).

**Table 2. Gender difference in physicians' attitudes and perceived barriers**

| Variables | | Male 15 (26.8%) | Female 41 (73.2%) | p |
|---|---|---|---|---|
| Age years (mean ± SD) | | 33.0±7.0 | 33.9±6.8 | 0.646 |
| The type of clinical practice, n (%) | Public health care service | 6 (40.0%) | 31 (75.6%) | 0.045* |
| | Private health care service | 1 (6.7%) | 1 (2.4%) | |
| | Both | 8 (53.3%) | 9 (21.9%) | |
| Marital status of the participants n (%) | Married | 8 (53.3%) | 26 (63.4%) | 0.229 |
| | Single | 6 (40.0%) | 15 (36.6%) | |
| | Divorced | 1 (6.7%) | 0 | |
| Physician category, n (%) | Registrars | 3 (20.0%) | 12 (29.3%) | 0.075 |
| | Specialists | 8 (53.3%) | 9 (21.9%) | |
| | Consultants | 4 (26.7%) | 20 (48.7%) | |
| Physicians who have never took sexual history, n (%) | | 1 (6.7%) | 12 (29.3%) | 0.076 |
| Physicians who obtained sexual history, only if there was a presumed association of sexual history with current health problems, n (%) | | 12 (80.0%) | 18 (43.9%) | 0.036* |
| Physicians obtained sexual history, only if the patient enquires about a certain concern, n (%) | | 5 (33.3%) | 13 (31.7%) | 0.908 |
| Physicians who thought sexual problems are not common in older adults, n (%) | | 6 (40.0%) | 12 (29.3%) | 0.446 |
| Physicians who thought older adults are not sexually active, n (%) | | 6 (40.0%) | 13 (31.7%) | 0.562 |
| Physicians who received adequate training to address sexual concerns, n (%) | | 5 (33.3%) | 12 (29.3%) | 0.770 |
| Physicians who thought sexual history taking should be a routine practice during CGA, n (%) | | 15 (100.0%) | 41 (100.0%) | - |
| Causes for not taking a sexual history from physicians' perspectives (more than one cause can apply) | | | | |
| The Lack of adequate time during the daily practice, n (%) | | 10 (66.7%) | 16 (39.0%) | 0.066 |
| Considering sexual history inappropriate, n (%) | | 5 (33.3%) | 13 (31.7%) | 0.908 |
| Patient may be offended, n (%) | | 11 (73.3%) | 32 (78.0%) | 0.711 |
| Older adults patients have little interest in sexuality, n (%) | | 5 (33.3%) | 16 (39.0%) | 0.697 |
| Older patients have major health concerns that is more important than sexuality, n (%) | | 12 (80.0%) | 28 (68.3%) | 0.390 |
| Lack of privacy during the interview, n (%) | | 9 (60.0%) | 31 (75.6%) | 0.252 |
| Inability to manage sexual problems, n (%) | | 4 (26.7%) | 12 (29.3%) | 0.849 |
| Obtaining sexual history from patients of opposite gender is rather difficult, n (%) | | 11 (73.3%) | 29 (70.7%) | 0.844 |
| Obtaining sexual history from patients of low educational level is rather difficult, n (%) | | 6 (40.0%) | 32 (78.0%) | 0.007* |
| Obtaining sexual history from patients of low social status is rather difficult, n (%) | | 5 (33.3%) | 29 (70.7%) | 0.011* |

n:number, SD: Standard deviation, CGA: Comprehensive geriatric assessment
*p <0.05: Statistical significance

**Table 3. Regression analysis for predictors of never taking a sexual history**

| Variables | Standardized β coefficients | SE | p | Odds ratio | 95% CI for Odds ratio |
|---|---|---|---|---|---|
| Age | 0.3 | 0.1 | 0.064 | 1.1 | 0.9-1.3 |
| Female gender | 2.4 | 1.5 | 0.105 | 0.1 | 0.0-1.4 |
| Being single | 21.7 | 4.0 | 1.000 | 0.9 | 0.1-6.0 |
| Being a registrar | 5.6 | 2.5 | 0.028* | 1.4 | 0.9-1.9 |
| Having conservative personality | -0.2 | 1.3 | 0.892 | 0.9 | 0.1-9.8 |
| Inadequate training | 18.6 | 1.9 | 0.999 | 0.1 | 0.0-0.7 |
| Underestimating sexual problems in older adults | 3.5 | 1.5 | 0.019* | 1.3 | 1.1-1.9 |
| Considering older adults as sexually inactive | 0.6 | 1.5 | 0.692 | 1.1 | 0.1-16.1 |
| Constant | -54.4 | 4.4 | 0.999 | - | - |

SE: Standard error, CI: Confidence interval
*p <0.05: Statistical significance

To our knowledge, this is the first study to address the Egyptian geriatricians' attitudes and barriers to proactive sexual history in clinical practice. Moreover, it is the first study to assess geriatricians' attitudes towards sexual history taking as part of the CGA in an Arab country.

Arab geriatricians may exhibit negative attitude towards sexual history taking as discussing sexuality is considered a cultural taboo. The cultural bias may exhibit prejudice against sexual orientation and sexually transmitted diseases. Yet, other administrative barriers should not be underestimated when addressing barriers to sexual health assessment.

In this survey, all interviewed geriatricians agreed that taking a sexual history should become a routine practice during CGA. Yet, 23% of them have never taken one, and about 70 % did not receive adequate training to address sexual concerns of their elder patients.

These findings agree with a previous study conducted in UK reported that geriatricians generally fail to take a sexual history from their patients. The barriers affecting the communication about sexual topics were embarrassment, being irrelevant, being inappropriate, and fear that patient may feel offended (12).

In this survey, the most common barriers were the fear of the patients' impression, the presence of major comorbid health problems, and the lack of privacy during the interview in 76.8%, 71.4%, and 71.4% of the responses, respectively.

In another study performed in Brazil, the main reasons for not obtaining a sexual history were the lack of time, fear of embarrassing the patient, and feelings of technical inaptitude (3).

Another important factor that may affect geriatricians' attitudes towards sexual history taking is proper training. About one third of our sample considered themselves properly trained to address sexual issues. In Egypt, like many other countries, the teaching of sexual health to medical undergraduates has not been consistent (13). Moreover, the training in sexual history taking and sexual health assessment and treatment remains inadequate for physicians (14). Thus, creating a uniform and standardized sexual health education program that provides geriatricians with the needed skills to address older adults sexual concerns need to be promoted.

Furthermore, we found that 18 (32.14%) of the respondents underestimated the prevalence of sexual problems in older adults and 19 (33.95%) of them reported that in their opinion older adults are not sexually active. This gap of knowledge may be attributed to underreporting of sexual issues in this age group.

In this study, interviewing a patient of opposite gender, low educational level, and low social class were perceived difficult by 71.4%, 67.9%, and 60.7% of the respondents, respectively. The patients' education and social status affected the attitudes of female geriatricians and the consultants.

### Study Limitations

This study has limitations, one being the small sample size, which is due to non-popularity of geriatric specialty in Egypt, as well as, the low response rates, which may result in non-response bias. Two, the survey did not address the patient related barriers for discussing sexuality.

## Conclusion

Many geriatricians in Egypt ignore the proactive sexual history taking due to lack of training, time pressure and personal bias. The findings of our study provide information allowing better understanding of factors affecting geriatrician's attitudes in order to improve sexually related prevention practices.

### Acknowledgements

The authors thank the participants of this study.

### Ethics

**Ethics Committee Approval:** The study methodology was reviewed and approved by the Research Review Board of the Ain Shams University Faculty of Medicine, Department of Geriatrics and Gerontology (GG-ASU-2019/18a).

**Informed Consent:** Informed consent was obtained from all physicians participating in this study.

**Peer-review:** Externally and internally peer-reviewed.

### Authorship Contributions

Concept: D.R., M.M., Design: D.R., Data Collection or Processing: D.R., M.M., Analysis or Interpretation: D.R., M.M., Literature Search: D.R., M.M., Writing: D.R.

**Conflict of Interest:** No conflict of interest was declared by the authors.

**Financial Disclosure:** No financial support was provided for the research or authorship of this article.

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ORIGINAL RESEARCH

**DOI:** 10.4274/ejgg.galenos.2019.226
Eur J Geriatr Gerontol 2019;1(3):101-106

# Chronic Pain and Related Factors in Patients Aged ≥80 Years

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## Abstract

**Objective:** Chronic pain ranks among one of the most common, costly and incapacitating conditions in later life. The prevalence of chronic pain in the adult population ranges from 20% to 50%. Pain among older persons is almost always the result of pathology involving a physical or psychological process. In this study, we aimed to assess the prevalence of chronic pain in older adults and factors associated with chronic pain.

**Materials and Methods:** A total of 215 patients aged ≥80 years were included in the study. In addition to the demographic characteristics of the patients, geriatric syndromes were assessed and comprehensive geriatric assessment of frailty and functional and nutritional status was performed to detect chronic pain prevalence and its associated factors in older adults. SPSS 21 for Windows program was used for statistical analysis.

**Results:** Of the patients included in the study, 145 were female (67.4%) and 70 were male (32.6%). The mean age of the patients was 83.9±3.5 years. Chronic pain was present in 124 patients (57.7%) and was more common in females (p=0.006). When the relationship between chronic pain and geriatric syndromes was evaluated, falls in the past year, urinary incontinence, frailty and depressive mood were found to be associated with chronic pain (p=0.04, p=0.001, p=0.000 and p=0.04, respectively). Female gender and frailty were independently associated with chronic pain with odds ratios of 2.07 and 4.78, respectively.

**Conclusion:** We found a high rate of chronic pain and geriatric syndromes as well as an association between them. To effectively address chronic pain in later life, a multimodal approach to treatment must involve a comprehensive assessment of pain in the older adult and management including pharmacologic and nonpharmacologic treatments that incorporate the functional, cognitive and comorbidity status of the patient.

**Keywords:** Chronic pain, frailty, urinary incontinence, depression, falls

## Introduction

Pain is a common and debilitating problem among older adults. In the definition of chronic pain, authors have used various durations of painful sensation, including pain longer than 3 months, 6 months or more (1). The prevalance of chronic pain in the adult population ranges from 20% to 50%, depending on the study population, the definition of "chronicity" and the definiton of the site of pain (2). Researches consistently show the prevalence of pain rising to a peak of 30-65% in the age group of 55-65 years and then declining somewhat to around 25-55% among those aged 85 years or over (3,4). Although there is a minor reduction in pain prevalence in the very old age group due to the survivor effect (i.e., persons with less favorable health conditions would have had early mortality), it is estimated that 25-55% of very old adults have at least one pain problem (5).

Despite the high prevalance of pain and its related negative effects on later life, pain is often underreported in older people. There is a common misconception about pain as if it is something inevitable to feel and should be tolerated, a stoic approach. Whereas, chronic pain does not constitute part of the normal aging process (6). It is almost always the result of pathology involving a physical or psychological process. Worldwide, the most common pain disorders reported by older people include arthritis (e.g., rheumatoid arthritis, osteoarthritis), back pain, and fibromyalgia (7,8). The ever-growing worldwide proportion of older people and lifespan show that chronic pain in older adults is an important issue and should be taken into account,

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**Received:** Oct 31, 2019 **Accepted:** Dec 01, 2019

**This study was presented in the 2nd International and 12th Annual Academic Geriatrics Congress in 2019 in Turkey.**

**Cite this article as:** Özkök S. Chronic Pain and Related Factors in Patients Aged ≥80 Years. Eur J Geriatr Gerontol 2019;1(3):101-106

as it causes burden to not only patient's self, but to health employee, caregivers and also economically.

Identification of risk factors associated with development and persistence of chronic pain is important, as it would enable targeting of preventive interventions and improve clinical management. Factors associated with chronic pain are relatively well defined among the general population and include younger age, female gender, lower social class, socio-economic status and psychological factors (e.g. anxiety and depression) (9). Actually, chronic pain rarely occurs solely as a single symptom during old age. Instead, previous cross-sectional studies have shown that chronic pain is generally accompanied by other symptoms and limitations of old age such as mood disturbance, sleep and mobility disorders (10,11). Therefore, this data brings to mind that there would be a relationship; may be common underlying risk factors and mechanisms between chronic pain and those common limitations known as geriatric syndromes.

Geriatric syndromes are prevalant especially in very old age group, but the relationship between persistent pain, one of the most incapacitating entities of senior life, with the geriatric giants are not well demonstrated in this population. Thus, our aim is to detect the prevalance of chronic pain, and assess relationship between chronic pain and geriatric syndromes among individuals aged ≥80 years.

## Materials and Methods

This study is retrospectively designed. The patients older than 80 years old, admitted to our geriatric outpatient clinic for any complaint were included in the study. Patients who were questioned for presence of chronic pain (pain in any site of the body that persists more than 3 months) are included in the study. Exclusion criteria were age <80 years and patients with missing data on chronic pain.

Age, gender, presence of chronic pain and geriatric syndromes are derived from the patient files. Geriatric syndromes are assessed in every patient during "comprehensive geriatric assessment" visits in our outpatient clinic. Patients were asked if they had experienced any fall during the last year. Sleep disturbance is questionned as if the patient had experienced difficulty in falling asleep and/or maintaining sleep at least three times a week and this difficulty had been a problem for at least one month (12). Constipation is questionned as if the patient had experienced unsatisfactory defecation as infrequent stool, difficult stool passage or both at least for previous 3 months. Dependence in activities of daily living (ADL) and instrumental activities of daily living (IADL) were assessed with Katz and Lawton ADL Scales. Maximum score of Katz index is 6 points, which means person is totally independent in basic ADL; and maximum score of Lawton scale is 8, which means person is totally independent in IADL. Therefore, patients were divided as totally independent; or dependent if he/she needs assistance in any activities questionned. Frailty was assessed by FRAIL scale which includes five components; fatigue, resistance, ambulation, illness and loss of weight. Frail scale scores range 0-5; ≥3 represents frail, 1-2 pre-frail and 0 for robust health status (13). In our study FRAIL score ≥3 was accepted frail and scores <3 non-frail. Cognitive state was assessed by questionning if patient had any complaint about their memory and also mini-mental state examination (MMSE) was applied. MMSE point <24 considered as impairment in cognitive functions (14). For assessment of depressive mood, patients were asked if they felt depressed or sad in the past month. Polypharmacy was defined as the use of ≥4 medications (15). Malnutrition is evaluated with mini nutritional assessment-short form (MNA-SF); ≤11 points considered as malnutrition (16). Because this is a retrospective study and the data were collected from patient files, no ethical committee approval was obtained.

### Statistics

A descriptive analysis was performed with means and standard deviations for continuous variables and frequencies for categorical variables. The two independent groups were compared by Mann-Whitney U test. Chi-square test with Yates's correction and Fisher's exact test was used when appropriate for nonnumeric data. Logistic regression analysis was used to find associations among chronic pain and GS. Statistical significance was determined at $p<0.05$. SPSS version 21 (IBM corporation, Armonk, NY, USA) was used for all statistical analysis in this study

## Results

Two hundred and fifteen patients aged ≥80 years were included in the study. One hundred and forty-five were female (67.4%). Mean age was 83.93±3.55 years. One hundred and twenty-four patients (57.7%) reported chronic pain. The prevalance of geriatric sydromes are shown in Table 1. The most common geriatric syndromes were polypharmacy (82.2%), dependence in IADL (64.2%) and sleep disturbances (56.3%). There was no significant relationship between age and chronic pain in adults older than 80 years (p=0.70). The relationship between chronic pain and gender and geriatric syndromes are given in Table 2. Chronic pain was significantly more common in female patients (p=0.006). When the relationship between chronic pain and geriatric syndromes were assessed, we found that patients who had falls in the past year, urinary incontinence, frailty and depressive mood were experiencing chronic pain more common (p values were; 0.04, 0.001, 0.000 and 0.04, respectively).

We found no significant relationship between chronic pain and malnutrition with MNA-SF cut-off point of ≤11, which not only includes patients with malnutrition, but also the ones with malnutrition risk. Therefore, we set the cut-off to ≤7 and

included only the patients with malnutrition according to the test. However, the result did not change and no significant relationship was found between two (p=0.77).

We performed regression analysis in order to detect independent factors associated with chronic pain. Chronic pain was our dependent variable, and the independent variables were female gender, frailty, falls, depressive mood and urinary incontinence. A statistically significant relationship was found between chronic pain and female gender and frailty, in regression analysis (p values were 0.02 and 0.00, respectively). The Odds ratios of chronic pain in female gender and frailty were 2.07 and 4.78 (95% confidence interval: 1.08-3.97 and 2.99-11.4), respectively.

**Table 1. Geriatric syndrome data of the participants**

| Geriatric Syndromes | N out of total (%) |
|---|---|
| Falls in the past year | 102/214 (47.7%) |
| Sleep disturbances | 121/215 (56.3%) |
| Urinary incontinance | 118/215 (54.9%) |
| Constipation | 79/213 (37.1%) |
| Dependence in ADL | 109/215 (50.7%) |
| Dependence in IADL | 138/215 (64.2%) |
| Frailty | 58/214 (27.1%) |
| Cognitive dysfunction (yes or no) | 81/213 (38%) |
| Cognitive dysfunction (MMSE) | 29/102 (28.4%) |
| Depressive mood | 67/199 (33.7%) |
| Polypharmacy | 176/214 (82.2%) |
| Malnutrition | 43/126 (34.1%) |

ADL: Activities of daily living, IADL: Instrumental activities of daily living, MMSE: Mini-mental state examination, N: Number of the patients

**Table 2. Univariate analysis for chronic pain related factors**

| Variables | Chronic pain (+) | Chronic pain (-) | p value |
|---|---|---|---|
| Age | 83.85±3.48 | 84.03±3.67 | 0.70 |
| Female gender | 93 (64.1%) | 52 (35.8%) | 0.006 |
| Falls in the past year | 66 (64.7%) | 36 (35.2%) | 0.04 |
| Sleep disturbances | 71 (58.6%) | 50 (41.3%) | 0.78 |
| Urinary incontinence | 80 (67.7%) | 38 (32.2%) | 0.001 |
| Constipation | 52 (65.8%) | 27 (34.1%) | 0.06 |
| Dependence in ADL | 69 (63.3%) | 40 (36.6%) | 0.09 |
| Dependence in IADL | 81 (58.6%) | 57 (41.3%) | 0.77 |
| Frailty | 47 (81%) | 11 (18.9%) | 0.000 |
| Cognitive dysfunction (yes or no) | 46 (56.7%) | 35 (43.2%) | 0.88 |
| Cognitive dysfunction (MMSE) | 15 (51.7%) | 14 (48.2%) | 0.26 |
| Depressive mood | 45 (67.1%) | 22 (32.8%) | 0.04 |
| Polypharmacy | 105 (59.6%) | 71 (40.3%) | 0.20 |
| Malnutrition | 28 (65.1%) | 15 (34.8%) | 0.56 |

ADL: Activities of daily living, IADL: Instrumental activities of daily living, MMSE: Mini-mental state examination

## Discussion

The data about chronic pain prevalance and pain related factors among very old population is limited and heterogenous, because of high variability mainly due to the differences across the studied populations, the methodology of the studies and variable definitions of pain chronicity (17,18). Therefore, our study is important in regards of contribution to the literature about this specific population. Our results suggest that chronic pain is prevalant in very old people and being female and frail seem to be significantly associated with suffering chronic pain.

Chronic pain was seen in 57.7% of our patients and seen more common in female ones. PolSenior study conducted in Poland among older adults showed that 41.8% of community dwelling individuals older than 80 years suffered from chronic pain (19). Blyth et al. (20) found that the prevalance of chronic pain was 55% for those aged above 85; which is similar to our finding. A Sweden study searched for the prevalance of chronic pain among oldest old and found that the percentage of mild or severe pain in individuals over 85 years was 68 (21). These differences in prevalance rates stem from lack of uniformity among these studies in terms of age, setting, and definition of chronic pain.

Female predominance in terms of chronic pain is an expected finding; as in the literature, it is often reported to be more common among women (22,23). Also, in logistic regression analysis, we have found that female gender is independently associated with chronic pain among oldest adults. There have been reported different risk factors for developing chronic pain, and female sex is one of the most prominent (24). The reason why female adults have a tendency to suffer chronic pain more than males is unclear. In fact, underlying biological differences in pain mechanisms may predispose women to have more pain but sociological and psychological factors also influence pain perception and behavior (25).

Frailty was significantly associated with chronic pain in our study. Also, in multivariate analysis, we found that frail older adults suffer chronic pain almost five times more than non-frail ones. There are many validated tools for assessment of frailty. We used FRAIL index and the questionnaire that seeks for individuals having more than five chronic comorbidities, weight loss and who are easily fatigued and have reduced capacity for ambulation and resistance. Therefore, it can be predicted that the profile this index offers as ''frail'' would be more prone to suffering pain than healthy and fit older adults. Current studies also support our findings (26,27). In addition, Lohman et al. (28) found that the inclusion of persistent pain as an additional criterion for frailty led to a potentially better prediction of

incident adverse outcomes. In addition, chronic pain among community-dwelling older adults is a risk factor for worsening frailty (29). Therefore, the development of an effective prevention strategy for frailty and effective management of chronic pain are crucial.

In the study population, chronic pain and fall history was significantly associated. However, fall history was not an independent risk factor for chronic pain. In fact, pain contributes to functional decline and muscle weakness, and is associated with mobility limitations that could predispose to falls (30). Falls on the other hand can be the major cause of pain experience and are strongly associated with a number of other poor health outcomes such as cognitive impairment, hip fracture, institutionalization and death (31). Multiple studies show that patients with chronic pain are more likely to have fallen in the previous year (32,33); but whether fall history is an independent risk factor for chronic pain seems to be unclear. Therefore, more studies on this spesific population, oldest adults, are needed about this issue.

There was a significant association between urinary incontinence and chronic pain in our study group. In fact, urinary incontinence was not an independent risk factor for chronic pain. There are studies showing strong associations between chronic pain and urinary incontinence (34,35) and urinary incontinence was found to be strongly associated with musculoskeletal disorders and back problems. Not only disk disease can affect bladder function, also mobility disorders related to arthritis and back problems can interfere with reaching the toilet. Furthermore, central sensitization, which is an induced state of spinal hypersensitivity and centrally amplified pain perception, is postulated to underlie the pathophysiology of a range of chronic pain and somatic conditions and show some similarities with pathophysiologic mechanisms believed to contribute to overactive bladder (36).

In univariate analysis, there was a significant association between depressive mood and chronic pain. However depressive mood was not an independent risk factor for chronic pain according to our logistic regression analysis. Many studies demonstrated that there is a strong association between both geriatric syndromes and it is an expected finding. Depression can lead patients to a negative and pessimistic perception and can have a negative effect on the patient's capacity to cope with pain (37,38). In neurobiologic terms, the main noradrenergic and serotonergic nuclei in the central nervous system are responsible for the chronicity of pain and development of depression (39). Actually, the result we obtained from regression analysis might be affected from examining depression with only one simple question. Using validated depression examining questionnaires (for example; geriatric depression scale) might change the result.

Our study does not suggest an association between dependence in ADL and chronic pain. There are studies showing relationship between disability in ADL and chronic pain (40,41); but those were not specifically carried out on "oldest" people. We know that the prevalence of dependence in ADL increases with old age; and our study population consists of individuals older than 80 years who already had increased rates of comorbidities and baseline functional limitations, independent of pain factor. Therefore, this may be the cause of the result we found.

There was no significant association between chronic pain and cognitive dysfunction. There are studies showing association between pain and cognitive dysfunction (42). Pain perception can affect patients' cognitive performance. In addition, analgesic therapies can either cause cognitive impairment; or according to another theory, they can improve cognitive abilities by alleviating pain (43). Therefore, this finding can be explained with the possibilities that: (i) the ones with chronic pain might have been taken optimal pain treatment or (ii) their pain intensity might not be enough to affect cognitive abilities. In fact, further analysis is needed about this.

More patients were experiencing sleep disorders in chronic pain group than the others; but this result was not statistically significant. One may expect a relation between pain and sleep disturbance; as Jank et al. (44) found that 45.5% of the patients suffering from chronic pain were experiencing sleep disorders and chronic pain and older age were significantly associated with sleep problems. In fact, the assessment of sleep disturbance is completely subjective and prone to inacurate recall and memory bias; therefore, studies with more objective diagnostic measures (like polysomnography) are needed.

There were more constipated patients in pain group; but this result was not statistically significant. Chronic pain and constipation can be companions to each other under the title of central sensitization (36). Also, taking opioids can induce constipation in chronic pain sufferers (45). We know that irritable bowel syndrome can present both with chronic abdominal pain and constipation and it is expected to be diagnosed more in younger population (46). Also, in our daily practice, we do not easily start opioid treatment otherwise we encounter severe pain that does not answer to other less strong treatment choices. Further analysis with assessment of pain location, severity and treatment choices for pain is needed. In fact, the p value we obtained was 0.067; and with a larger study group, a significant relation may be found.

There were more malnourished patients in chronic pain group, as predicted by MNA-SF; but this result was not statistically significant. Chronic pain is associated with poor appetite, and since as many as half of all community dwelling older people suffer from chronic pain, this may contribute significantly to loss of appetite in older people (47). Actually, mini nutritional

assessment (MNA) evaluates not only appetite, but also psychological status, acute illnesses and body mass index (BMI) of individuals. Therefore, all items seperately can affect the results. Furthermore, obesity is a great cause of knee and back pain in older adults, but BMI more than 30 does not cause a reduction in MNA scores, as if patient is healthy in terms of nutrition. Therefore, anthropometric measurements may give more objective and accurate results on relationship between nutrition and chronic pain.

Polypharmacy was the most common geriatric syndrome in our study and was more prevalent in chronic pain sufferers; but this result was not statistically significant. Actually, patients dealing with chronic pain demand and use more medication than healthy individuals, and it can be expected to find a significant association between these two issues. In a Turkish study with 1000 community dwelling older adults, Ersoy and Engin (48) found that chronic pain was an independent risk factor for daily drug consumption in older patients. In fact, our study group consists of solely individuals older than 80 years. Also, our institution is a tertiary healthcare center and in our daily practice, we meet so many inappropriate medication use and prescription cascades. There are probably stronger factors associated with polypharmacy, rather than chronic pain in this population. Further detailed studies are needed.

### Study Limitations

Our study has a few limitations. First of all, the sample size is small and consists of patients referred to a tertiary healthcare institution. Therefore, it does not represent the whole population. Secondly, evaluation of geriatric syndromes might be made in a more detailed way. For example, depression might be evaluated with geriatric depression scale and malnutrition with mini nutritional assessment long form. One other limitation is the fact that there is no objective way of detection of chronic pain. Patiens might not remember the pain experience and furthermore neglect it. Therefore, the results might be affected by subjective or recall bias. On the other hand, our study is important because it works on a special population, oldest old adults and contributes to the literature about a special topic in a comprehensive way.

## Conclusion

In this study evaluating chronic pain and related factors in patients older than 80 years, we found a high prevalence of chronic pain and we suggest that female gender and frailty are independent factors associated with chronic pain experience in oldest adults. Indeed, further detailed studies are needed about this issue on this special age group. Chronic pain should not be seen as an inevitable part of ageing and should be taken into routine geriatric assessment and managed properly.

### Ethics

**Ethics Committee Approval:** Because this is a retrospective study and the data were collected from patient files, no ethical committee approval was obtained.

**Informed Consent:** Because this is a retrospective study and the data were collected from patient files, no informed consent form was obtained.

**Peer-review:** Externally and internally peer-reviewed.

**Financial Disclosure:** The author declared that this study received no financial support.

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CASE REPORT

**DOI:** 10.4274/ejgg.galenos.2019.131
Eur J Geriatr Gerontol 2019;1(3):107-111

# Approach to DRESS Syndrome Associated with Allopurinol Use in a Geriatric Patient

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## Abstract

Drug rash with eosinophilia and systemic symptoms (DRESS syndrome) is a rare and life-threatening drug-induced hypersensitivity reaction. Here, we present the case of an old man diagnosed with DRESS syndrome after allopurinol therapy. This case highlights the importance of being vigilant for drug toxicity reactions due to allopurinol use that may occur in older adults.

**Keywords:** Allopurinol, drug toxicity, hypereosinophilia

## Introduction

Drug rash with eosinophilia and systemic symptoms (DRESS syndrome) is a rare and life-threatening drug-induced hypersensitivity reaction that presents with skin rashes, hematological abnormalities such as eosinophilia and atypical lymphocytosis, lymphadenopathy, and involvement of internal organs such as the liver, kidney, and lung. Here, we present the case of a 65-year-old man diagnosed with DRESS syndrome after allopurinol therapy. This case highlights the importance of being vigilant for drug toxicity reactions that may occur in older adults due to allopurinol use.

## Case Presentation

A 65-year-old man presented to the emergency department with complaints of generalized itching, low-grade fever, and rash covering his body. He reported that the pruritus started 10 days before the admission. Three days after the onset of pruritus, he had also developed a fever of 39°C and rashes starting on the extremities and spreading over his entire body. Systemic inquiry revealed the additional complaint of reduced urine output. On physical examination, his general condition was fair, body temperature was 38.7°C. Three days after the onset of pruritus, he had developed a fever of 39°C and rashes had started on his extremities and spread over the entire body. Facial edema was developed and erythematous maculopapular rashes were observed on his back, trunk, and bilateral upper and lower extremities (Figures 1, 2, and 3). There was no oral mucosal involvement. Other system examinations were normal. The patient's medical history included no known diseases, but the patient reported that he had started allopurinol therapy (300 mg/day) due to hyperuricemia 1 month before the admission. There was no other medication than allopurinol. His family history was unremarkable.

At the time of presentation to the emergency department, his creatinine level was 6.59 mg/dL (0.67-1.17 mg/dL), white blood cell count was 23,000/µL (3,900-10,800/µL), neutrophil count was 16,300 (2,300-7,600), eosinophil count was 3000 (10-500), and leukocytosis, eosinophilia (13%), and atypical lymphocytes were detected in peripheral blood smear. Complete urinalysis revealed leukocyturia (53; 0-4), hematuria (32; 0-3), and no proteinuria. On abdominal ultrasound, kidney size, parenchymal echo, and collecting systems were normal bilaterally.

The patient was admitted to our ward with a preliminary diagnosis of renal failure and DRESS syndrome due to allopurinol

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**Received:** Aug 17, 2019 **Accepted:** Oct 23, 2019

**Our case will be presented as an oral presentation in 5th Drug and Treatment Congress 2019.**

**Cite this article as:** Sevinç C, Tosun Taşar P, Büyükkurt E. Approach to DRESS Syndrome Associated with Allopurinol Use in a Geriatric Patient. Eur J Geriatr Gerontol 2019;1(3):107-111

use. The patient was started on intravenous hydration, 40 mg/day methylprednisolone, and oral antihistamine therapy. The patient's skin lesions began to regress during follow-up and dose of steroid was tapered. The patient received the steroid therapy for a total of 9 days, during this time itchy skin lesions and facial edema and leukocytosis were regressed. C-reactive protein and alanine aminotransferase levels decreased to within normal reference range and the patient's creatinine level decreased to 1.24 mg/dL. Following steroid therapy, the patient's fever gradually fell. The patient's pre-treatment and post-treatment values are summarized in Table 1.

## Discussion

DRESS syndrome is a type IV hypersensitivity reaction. It is characterized by severe skin rashes, fever, lymphadenopathy, hematological abnormalities (eosinophilia or atypical lymphocytes), and internal organ involvement. Although the pathogenesis of DRESS syndrome is not fully known, immunological factors, genetic factors, and factors involved in drug detoxification pathways have been implicated (1). Aromatic anticonvulsants (phenytoin, phenobarbital, carbamazepine) and sulfonamides are the most common causes of DRESS syndrome. Lamotrigine, allopurinol, nonsteroidal anti-inflammatory drugs, captopril, calcium channel blockers, terbinafine, metronidazole, minocycline, and antiretroviral drugs may also cause DRESS syndrome (2). The frequency of allopurinol-induced DRESS syndrome is about one in 260 patients treated with this drug (3). Genetic associations between human leukocyte antigen (HLA) associations and drug hypersensitivity may occur. HLA-B*1508, associated with allopurinol induced Stevens-Johnson syndrome and toxic epidermal necrolysis (4,5).

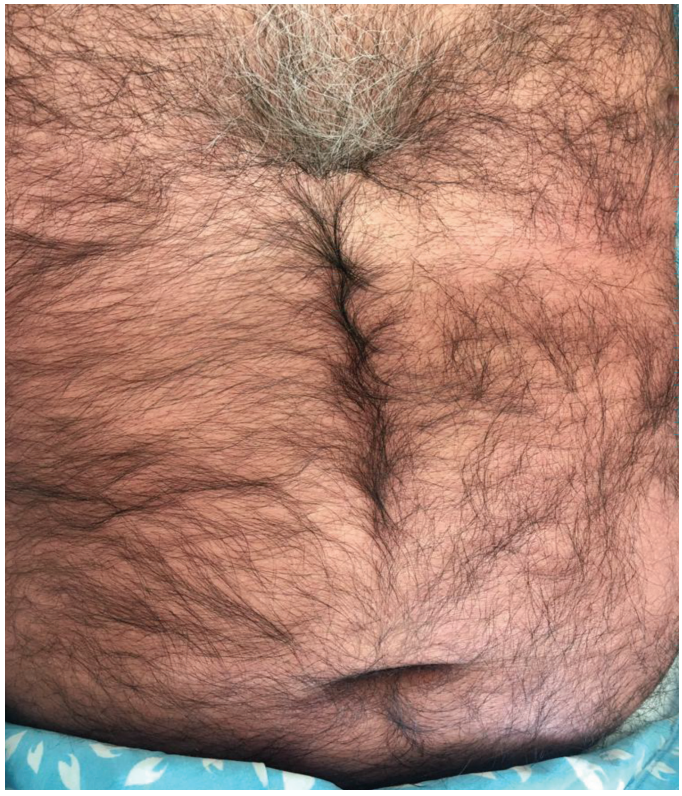

**Figure 1.** Widespread erythematous maculopapular rashes on the abdomen and chest

In most patients, the reaction begins 2-6 weeks after initiation of the inducing drug (3). In our patient, the most likely cause of DRESS syndrome was allopurinol, which the patient had started taking 1 month earlier for hyperuricemia.

Currently, the indications for allopurinol therapy are hyperuricemia (gouty arthritis, urate nephropathy, nephrolithiasis) and prophylaxis against urate nephropathy during chemotherapy for neoplastic diseases. Allopurinol

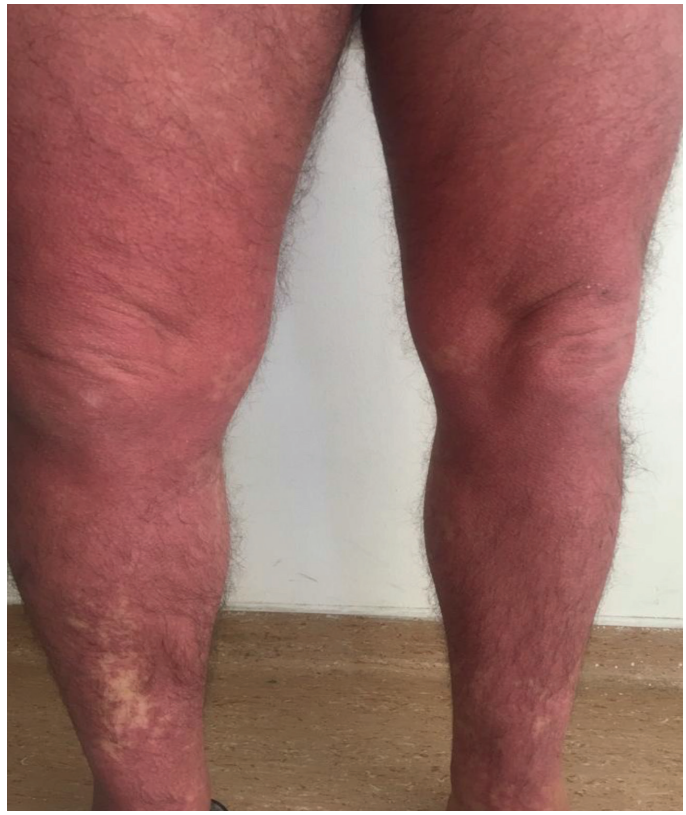

**Figure 2.** Erythematous maculopapular rashes on both of the patient's lower extremities

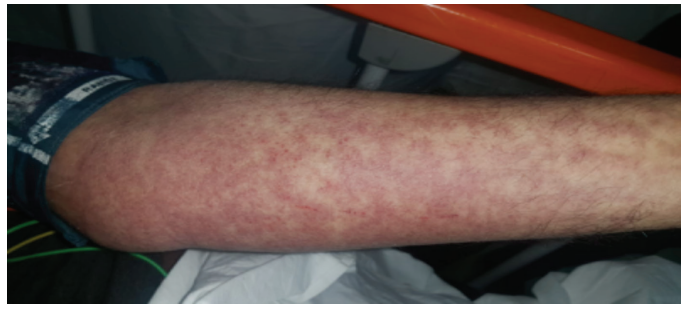

**Figure 3.** Erythematous maculopapular rash on the patient's upper extremity

should be used only in these cases and at the appropriate dose. The likely mechanism underlying the development of DRESS syndrome due to allopurinol use is hypersensitivity to allopurinol or oxipurinol (the main metabolite of allopurinol) and immune complex formation with subsequent vasculitis (6).

Oxipurinol accumulation, especially in patients with reduced renal clearance, increases the risk of developing DRESS syndrome. Numerous studies have shown that advanced age, comorbid kidney disease, high-dose drug use, and concomitant use of thiazide diuretics constitute a potential risk for allopurinol-induced DRESS syndrome (7). Fever, malaise, lymphadenopathy, and skin eruptions are the most common symptoms (8).

The rash usually presents in the form of facial and periorbital edema with widespread erythematous eruptions on the trunk and upper extremities. About half of all cases exhibit facial edema (9). Body surface area demonstrates degree of disease involvement and is an important indicator of disease severity. In most cases, over 50% of the body surface area is erythematous (9). Our patient also had marked facial edema and diffuse erythema on his body (Figures 1, 2, and 3).

At least one internal organ is involved in approximately 90% of the patients. Two or more organs are involved in 50-60% of cases, most commonly the liver, kidney, and lung (9-11).

Renal involvement manifests as acute interstitial nephritis and occurs in 10-30% of DRESS cases, most frequently in those associated with allopurinol (12,13). Renal abnormalities include a moderate increase in creatinine level, low-grade proteinuria, and in rare cases, abnormal urinary sediment containing eosinophils. He had no sign or symptom of other systems involvement.

To help clinicians confirm or exclude the diagnosis of DRESS syndrome, the European Registry of Severe Cutaneous Adverse Reactions (RegiSCAR) developed a scoring system based on clinical features, degree of skin involvement, organ involvement, and clinical course (8). According to this scoring

**Table 1. Comparison of the patient's laboratory values at presentation with post-steroid therapy**

| Laboratory variables | Pre-treatment values | Post-treatment values | Reference range |
|---|---|---|---|
| White blood cell count (x$10^3$/µL) | 23.02 | 11.26 | 3.9-10.8 |
| % Eosinophil | 13.4 | 13 | 0.1-6.3 |
| Hemoglobin (g/dL) | 12.4 | 9.9 | 14.4-18.3 |
| Erythrocyte sedimentation rate | 4 | 5 | 0-20 |
| C-reactive protein (mg/L) | 48.1 | 6.89 | 0-5 |
| Urea (mg/dL) | 142 | 77 | 17-43 |
| Blood urea nitrogen (mg/dL) | 66.36 | 35.98 | 6-22 |
| Alanine aminotransferase (U/L) | 69 | 30 | 1-50 |
| Aspartate aminotransferase (U/L) | 37 | 24 | 1-50 |
| Gamma-glutamyl transferase (U/L) | 51 | 40 | 1-55 |
| Creatinine (mg/dL) | 6.59 | 1.24 | 0.67-1.17 |
| Albumin (g/dL) | 2.51 | 2.69 | 3.5-5.2 |

**Table 2. RegiSCAR DRESS syndrome scoring system**

| | | Present | | Absent |
|---|---|---|---|---|
| Fever ≥38.5°C | | 0 | | -1 |
| Enlarged lymph nodes (>1 cm in size, at least 2 regions) | | 1 | | 0 |
| Eosinophilia: ≥700 or ≥10% (leukopenia) | ≥1500 or ≥20% (leukopenia) | 1 | 2 | 0 |
| Atypical lymphocytes | | 1 | | 0 |
| Rash covering ≥50% of body surface area | | 1 | | 0 |
| Suspicious rash (≥2 facial edema, purpura, infiltration, desquamation) | | 1 | | 0 |
| Skin biopsy suggesting an alternative diagnosis | | -1 | | 0 |
| Organ involvement: 1 | 2 or more | 1 | 2 | 0 |
| Disease duration >15 days | | 0 | | -1 |
| Investigation of 3 or more alternative causes (blood cultures, anti-nuclear antibody, serology for hepatitis viruses, *Mycoplasma, Chlamydia*) with negative results | | 1 | | 0 |

Total score <2: impossible; 2–3: possible; 4–5: probable; ≥6: definite
RegiSCAR: The European Registry of Severe Cutaneous Adverse Reactions, DRESS: Drug rash with eosinophilia and systemic symptoms

system, DRESS syndrome is classified as definite, probable, or possible (Table 2). Our patient received a RegiSCAR score of 7 (fever, eosinophilia, atypical lymphocytes, involvement of more than 50% of the body surface area, facial edema, kidney and liver involvement), resulting in a definite diagnosis of DRESS syndrome.

There is no standard treatment for DRESS syndrome. The first step in treatment is to discontinue the suspected drugs. Corticosteroids can dramatically improve clinical condition (14-17). Early discontinuation of the drug causing DRESS syndrome will lead to better outcomes. DRESS syndrome can cause life-threatening multiple organ failure (18,19). The mortality rate is 10% (16). Intravenous immunoglobulins, plasmapheresis, or a combination of these treatments can be used if symptoms worsen (20).

Systemic corticosteroid therapy is recommended for patients with renal involvement presenting with proteinuria, hematuria, or an increase in creatinine level more than 150% over baseline. Medium to high doses of systemic corticosteroids are used (e.g., 0.5-2 mg/kg/day of prednisone or its equivalent). Systemic corticosteroids are administered until clinical improvement and normalization of laboratory parameters are achieved.

The use of systemic corticosteroids for the treatment of DRESS syndrome with severe organ involvement has not been assessed in randomized trials. However, the general consensus among experts is to use systemic corticosteroids in DRESS, particularly for patients with severe organ involvement, especially renal and/or pulmonary involvement.

The optimal dose and duration of corticosteroid therapy is not known. Nevertheless, retrospective observational studies have shown that most DRESS patients with or without severe organ involvement are treated with systemic corticosteroids (13,17,21,22). In our patient, skin lesions resolved and creatinine levels decreased after corticosteroid therapy.

## Conclusion

DRESS syndrome is a condition that presents with fever, rash, elevated liver function markers, and systemic symptoms. When investigating the etiology of sepsis and fever, drug use should be questioned during history-taking and DRESS syndrome should be included in the differential diagnosis. In addition, it should be remembered when initiating allopurinol therapy in patients with chronic kidney disease that they may develop DRESS syndrome. If DRESS syndrome is suspected, the patient should be asked in detail about all drugs they have recently used. The main principles of treatment are early diagnosis, discontinuation of the suspect drug, and supportive care. Favorable outcomes are reported with systemic corticosteroid therapy, especially in severe cases.

### Ethics

**Informed Consent:** Informed consent was obtained from the patient.

**Peer-review:** Externally and internally peer-reviewed.

### Authorship Contributions

Concept: C.S., Design: C.S., P.T.T., Data Collection or Processing: C.S., P.T.T., Analysis or Interpretation: E.B., Literature Search: P.T.T., Writing: C.S., P.T.T., E.B.

**Conflict of Interest:** No conflict of interest was declared by the authors

**Financial Disclosure:** The authors declared that this study received no financial support.

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DOI: 10.4274/ejgg.galenos.2019.198
Eur J Geriatr Gerontol 2019;1(3):112-113

# Aging and Fall: Vision Related Signs on Head Computed Tomography

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**To the editor,**

On a normal morning with passing clouds, a 69-year-old man fell on dry level ground during his regular morning walk after breakfast over the usual trail. He enjoyed good past health, without smoking and drinking, but history of bilateral consecutive retinal detachment (RD) surgery 2 years ago. He had high myopia of-10 Diopters before the eye operations, and was on nocte prostaglandin analogue, Latanoprost, for intraocular pressure (IOP) control. Latest best corrected visual acuity was Snellen 0.3 and 0.2 with IOP 13 and 11 mmHg for right and left eye respectively. His post-operative refractions were -2.5 Diopters over both eyes with glasses for distance. There was no dizziness, nor chest discomfort. Medical workup in the hospital revealed stable 24-hour blood pressure without postural hypotension, and normal blood glucose level with fasting and HbA1c. Endocrine blood tests were all normal. Detailed examinations by physicians did not reveal any cerebral or cardiovascular cause for his fall episode, whereas gait, balancing, coordination, muscle strength assessments were all acceptable. Computed tomography (CT) of the brain was normal, except bilateral regular hyperdensities over the orbits, suggestive of bilateral buckles over each globe, and trochlear calcifications (Figure 1). Visual cause for his fall was concluded.

Elderly fall is common in our community, and visual cause is not rare (1). CT of the head is commonly performed for these patients, and clues for visual impairment may be seen (2). Although in elderly, RD and glaucoma affects daily living activities more from compromised peripheral visual field. Concerning our case, radiological signs on head CT for RD, glaucoma and trochlear calcifications are discussed.

With high prevalence of myopia and less awareness in the past, RD is more common in Asian elderly. Before the era of vitrectomy, RD repair surgery requires explant to oppose the detached retina. This can be segmental buckle alone or in the form of encircling band. Commonly made of silicone with its inert and safety profile, these buckling materials appear as hyperdensity on CT. As retinal breaks are usually anteriorly located, and over superior quadrant, location of buckles follows. Bilateral RD is not common, and vitreous abnormalities other than high myopia should be considered.

Glaucoma is common in elderly, no matter from aging or cataract, inflammatory or iatrogenic causes. Being one of the top causes of blindness worldwide, glaucoma is mainly managed by IOP control. Treatment is evolving from traditional trabeculectomy to Glaucoma Drainage Devices. These devices appear as different shapes of hyperdensity on CT, depending

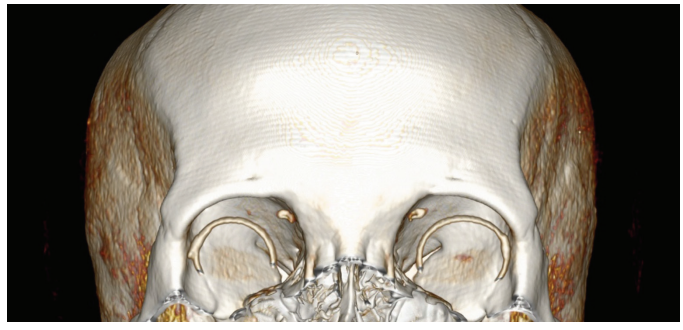

**Figure 1.** Vision related signs on head computed tomography

Signs over different planes were better demonstrated with 3D reconstruction of computed tomography of the superior orbit. Bilateral trochlear calcifications were seen over superomedial orbit, whereas bilateral encircling bands with sleeves over superotemporal quadrant outlines the globe position

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**Received:** Sep 25, 2019 **Accepted:** Nov 01, 2019
**Cite this article as:** Au SCL, Ko STC. Aging and Fall: Vision Related Signs on Head Computed Tomography. Eur J Geriatr Gerontol 2019;1(3):112-113

on their composition materials such as the Ophthalmological Signet Ring sign (3).

Trochlear calcification, having 13% of prevalence in the population, appears as hyperdensity in the superomedial orbit; however it is not specific to age (4). Having similar proportion of unilateral and bilateral distribution, trochlear calcification should be cautiously differentiated from foreign body in the orbit after a fall episode.

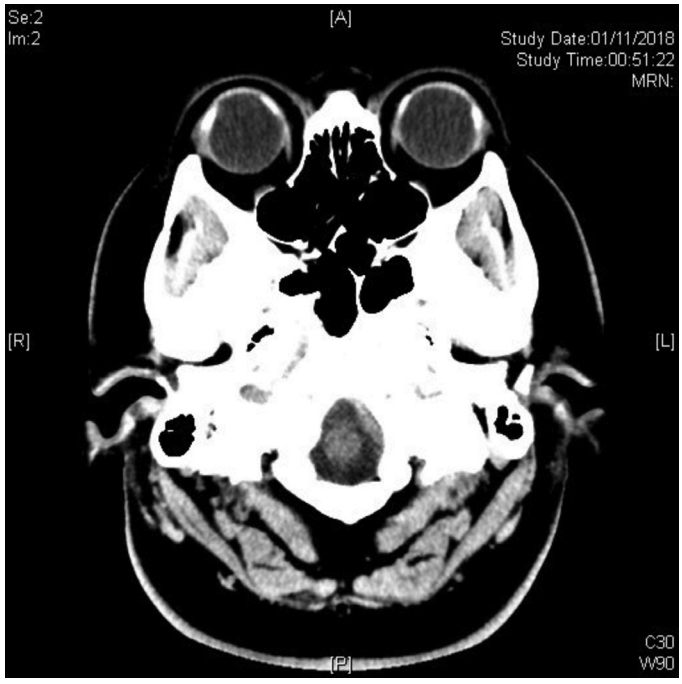


**Figure 2.** Transverse cut of computed tomography over orbits

Both eyes encircling band silicone buckles were seen as hyperdensity over temporal and nasal side of each globe with mild indentation into the eyeballs

In conclusion, signs of RD and glaucoma on head CT are clues to poor vision in elderly fall. However, ophthalmological examination is still fundamental to establish the diagnosis.

**Keywords:** Computed tomography, eye, buckle, calcified trochlea

### Ethics

**Peer-review:** Externally peer-reviewed.

### Authorship Contributions

Concept: S.C.L.A., Design: S.C.L.A., Data Collection or Processing: S.C.L.A., Analysis or Interpretation: S.C.L.A., Literature Search: S.C.L.A., Writing: S.C.L.A., S.T.C.K.

**Conflict of Interest:** No conflict of interest was declared by the authors.

**Financial Disclosure:** The authors declared that this study received no financial support.

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