RMMG
Revista Médica de Minas Gerais

REVIEW ARTICLE

Applicability of the frailty evaluation instruments - Index of Clinical-Functional-20 Vulnerability (IVCF-20) and the Vulnerable Elders survey (VES-13)

Aplicabilidade dos instrumentos - Índice de Vulnerabilidade Clínico-Funcional-20 (IVCF-20) e o Vulnerable Elders Survey (VES-13)

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ABSTRACT

Introduction: The frailty syndrome is a condition frequently found in the elderly population, and it is associated with the reduction of functional capacities of the person. It is important to early identify vulnerable individuals for planning the necessary care to delay this condition, and to treat those who are already fragile. **Objectives:** Evaluate the applicability of the IVCF-20 and VES-13 instruments, which are used for screening vulnerable elderly, identify the usage scenarios for each case, compare the number of samples, and understand the psychometric properties evaluated. **Methods:** A total of 12 articles were evaluated on the pre-defined electronic databases. The evaluation of psychometric properties was done according to the criteria established by the standards based on the Consensus-based Standards for the Selection of Health Measurement Instruments (COSMIN). **Results:** Within the years of 2015 and 2019, it was noticed the prevalence of studies discussing IVCF-20, being 8/13 articles about that instrument. Regarding the assessment of reliability and validation, most studies presented better validation than reliability results. **Conclusion:** The instruments are great allies of clinical practice, as they allow a multidimensional assessment of the elderly.

Keywords: Frailty; Aged; Assessment; Data Accuracy.

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Amazonas, Brazil.

Supporting sources:
None.

Conflict of Interest:
None.

Ethics Committee:
Not applicable.

Clinical Trial Registration:
Not applicable.

Preprint URL:
Not applicable.

Received on: 12 June 2022
Approved on: 2 January 2023
Publication Date: May 3, 2023.

DOI: 10.5935/2238-3182.2023e33206

RESUMO

Introdução: A síndrome da fragilidade é uma condição frequente na população idosa e está associada à redução das capacidades funcionais do indivíduo. É importante a identificação precoce dos indivíduos vulneráveis à síndrome de fragilidade para o planejamento dos cuidados necessários para o retardo dessa condição, e do tratamento daqueles que já se apresentam fragilizados. **Objetivo:** Avaliar a aplicabilidade dos instrumentos IVCF-20 e VES-13 utilizados para rastreamento de idosos vulneráveis, identificando seus cenários de aplicação, número das amostras e propriedades psicométricas avaliadas. **Métodos:** Foram avaliados um total de 12 artigos nas bases eletrônicas pré-definidas, a avaliação das propriedades psicométricas foi de acordo com os critérios estabelecidos pelas normas baseadas no consenso para seleção de instrumentos de medição da saúde (COSMIN). **Resultados:** Nos anos de 2015 a 2019, notou-se a prevalência de estudos com a temática IVCF-20, sendo 08/13 artigos. No que se refere a avaliação de confiabilidade e validação, a maioria dos estudos apresentaram melhor validação do que confiabilidade. **Conclusão:** Conclui-se que os instrumentos são grandes aliados da prática clínica, por permitirem uma avaliação multidimensional do idoso.

Palavras-chave: Fragilidade; Idoso; Avaliação; Confiabilidade de dados.

Introduction

The aging of the world population is growing and is becoming increasingly evident in Brazil. According to data from the Brazilian Institute of Geography and Statistics, produced in 2019[1], the number of elders in the country achieved the mark of 30,2 million people in 2017, which represents an increase of more than 4,8 million elders between 2012 and that year. Thinking globally, estimates are that in 2050 the elderly will be equal to a fifth of the world population. Some factors are contributing to this life expectation increase, the first is the rapid and continuous decrease in fertility levels, the second is the decrease in mortality of all ages, and the last is the change of disease patterns[2,3].

Previously, there were many accounts of infectious and parasitic diseases affecting kids, and that was an obstacle to their growth and development. Nowadays, after a significant evolution in healthcare, people have more longevity, thus, nontransmissible chronic diseases (NTCD) became more common, and since are directly related to the changes in dietary patterns, lifestyle, and healthcare assistance services, the NTCD became one of the main challenges for the elderly[2,3].

According to Moraes et al. (2016)[4] e Barbosa et al. (2019)[5] the number of chronic diseases and the age of the individuals per se do not determine the functional capacity of the elder. Therefore, the evaluation of the functional capacity allows the verification of the elder's independence in basic and instrumental capacities, such as: taking a shower, getting dressed, doing their personal hygiene, moving around, eating, maintaining their bladder continence, preparing meals, controlling their finances, take medications, clean the house, do the shopping, use the public transportation, use the telephone, and walking certain distances[6].

Following this reasoning, it can be said that the frailty syndrome is multifactorial, characterized by the decrease of functional reserve and by the increase of vulnerability to be subject to adverse events. Thus, the elder considered vulnerable is the one who does not present frailties, but that has the risk of developing this condition[7]. Bearing that in mind, the elderly with a predisposition and bigger probabilities of developing adverse clinical outcomes require specialized services, once the lack of care can compromise their independence, increase odds of falls, infections, deficiencies, hospitalizations, institutionalization, sequels, incapacities, or death[8-11].

It is important to highlight that there are many instruments to triage vulnerabilities in the elderly which were already described in the literature. However, health staff and researchers must be aware of which ones are more adequate and precise to guarantee the quality of their results. Within this context, the identification of frail elders or elders at risk of frailty must be one of the fundamentals for geriatric care, once the frailty syndrome is a complex and important matter associated with aging[12].

As a consequence, in this literature review, we will evaluate the applicability of VES-13 and IVCF-20 instruments. The VES-13 encompasses 13 (thirteen) items of health self-awareness, presence of physical limitations, and functional decrease. The VES-13 was included by the Brazilian Health Ministry in the health book of the elderly back in 2014, under the name "Protocol for the Identification of Vulnerable Elders VES-13"[13,14].

The IVCF-20 is a Brazilian instrument that is very simple and easy to apply. It has the advantage of being multidimensional, once it evaluates 08 (eight) dimensions considered predictors of functional decrease and/or of death risks, such as age, health self-awareness, daily life activities, both instrumental and basic, cognition, humor/behavior, mobility, communication, and the presence of multiple comorbidities[15,16].

Therefore, this bibliography review has the objective to identify from the scientific literature the applicability of IVCF-20 and VES-13 instruments on the fast detection of vulnerable elders, as a strategy to promote and/or delay the appearance of the frailty syndrome, ultimately pursuing the maintenance or increase of life quality to elders.

Methods

This descriptive and documental research aims to evaluate the applicability of the IVCF-20 and VES-13 instruments, utilized to identify the risk of the clinical-functional vulnerability of elders.

To conduct this bibliographical collection, secondary sources of scientific periodicals were consulted, and indexed in the following database: *Literatura Científica e Técnica da América Latina e Caribe* – LILACS (Scientific and Technical Literature for Latin America and Caribe), *Biblioteca Virtual em Saúde* – BVS (Virtual Library in Health), Medical Literature Analysis and Retrieval System Online – MEDLINE, and the Scientific Electronic Library Online – SciELO. The choice for these databases was due to easiness of access and online search, which increases the effective use of time, the costs x benefits of the research, and the data collection. The following descriptors and Boolean operators were used: IVCF-20 AND VES-13 OR Instrument AND Clinical-Functional Vulnerability Index.

The data collection was carried out between October and November 2019, when scientific literature, both in Portuguese and Spanish, was selected. All articles had open access and were published between 2015 and 2019. A total of 112 articles were found, and amongst them were excluded those which were duplicated (in more than one database) and those that stood out from the topics covered. After concluding these steps, we obtained a total of 12 periodicals, being 2 from MEDLINE, 5 from SciELO, and 5 from LILACS.

The analysis was done according to the steps provided by Lima e Mioto (2007)[17], following an explanatory, selective, and interpretative reading of all articles, in order to categorize information. Lastly, the results found during the search were interpreted[18].

The data extraction was done by 02 (two) reviewers using a form pre-conceived by authors. The definitions utilized for the psychometric properties followed the criteria established by the Consensus-based Standards for the Selection of Health Measurement Instruments – COSMIN.

COSMIN criteria:

- **Reliability:** the capacity to produce a consistent result over time and space, or the quality of the study validated by distinct observers, indicating coherence, precision, stability, equivalence, and homogeneity. This is one of the main criteria to evaluate an instrument;
- **Validity:** refers to the capacity of an instrument to measure precisely what needs to be measured. However, the validity is not a quality per se that should be determined regarding the instrument, rather it is a particular question that refers to a pre-established population[19].

Results

During the review process, it was noticed that one of the articles did not address the topic, and because of it, such articled was removed from this review. In other words, after the selection, 12 out of 13 articles met the criteria to be included in this descriptive review, and the criteria for that are described on Figure 1.

From the 12 articles analyzed, 1 was from 2016, 2 were from 2017, 3 were from 2018, and 6 were from 2019. Regarding the language, 11 of them were published in Portuguese and 1 in Spanish. In terms of location, 10 of them were published in Brazil, 1 in Portugal, and 1 in Peru. Amongst these articles, 7 applied the IVCF-20, and 05 (five)

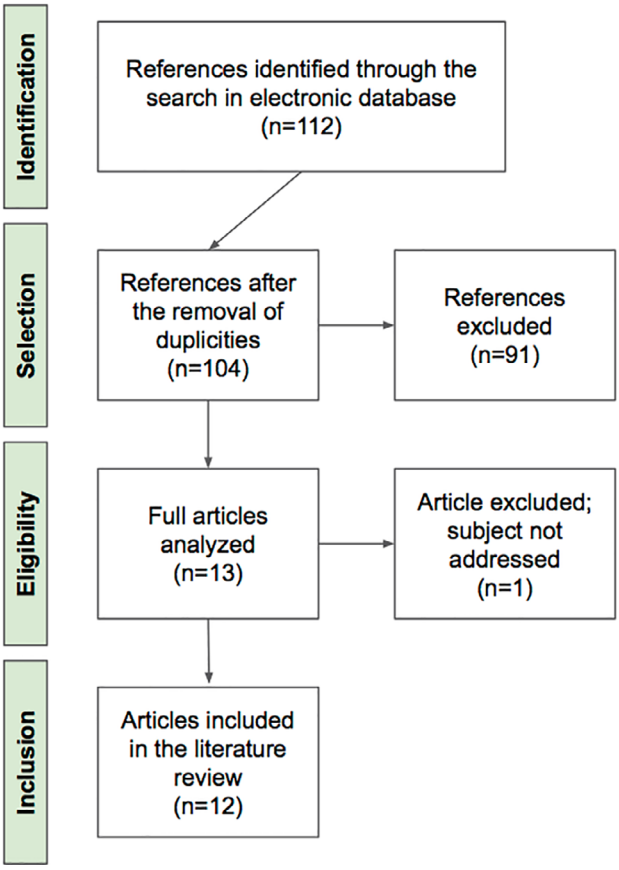


Figure 1. Flowchart of the differences between stages according to the databank MEDLINE, SciELO, and LILACS, in the period between 2015- 2019.
Source: Authors (2022).

applied the VES-13. In both cases, the instruments and samples were used in primary care.

According to Chart 1, which shows that 7 articles about IVCF-20 were selected, most of the publications were in the year 2018, and the minority of publications were in 2016. These data were gathered between 2015 and 2019, and all searched articles were about research involving human beings, and they all used different types of methodologies.

According to Chart 2, 5 articles around the theme VES-13 were selected, most of them were published in 2019, and the minority in 2017. For this analysis, the timeframe between 2015 and 2019 was considered. All articles were about research involving human beings, and different methodologies were used.

The number of participants in the study involving IVCF-20 was 1,928 in total, being the lowest 31[5] and the highest 397[22]. As for the studies involving VES-13, a total of 2,876 elders were part of the research, being 181[26] participants the lowest and the highest 1,062[13], as described in graphic 01. Most participants were aged 60 or plus.

Among the elders with frailty risks on IVCF-20 instrument, the less prevalence was 38%[15] and the highest number was 43%[9,22,23], hence, the average prevalence was equal to 41,7%. Regarding the same risk using the VES-13, the less prevalence was 16,6%[13] and the highest number 49,1%[26], hence, the average prevalence was equal to 29,08%, as described in graphic 02.

It can be noticed that many different tests were used, and in some cases, more than one test was used to evaluate the reliability and correlation of the instruments. The tests used were the Item Response Theory (IRT), the Cronbach Alpha, the biserial correlation, the ANOVA, the Kruskal-Wallis tests, the Fisher and Pearson correlation, the AUC-ROC statistics, and the Student's t-test.

Chart 1. Description of articles with the instrument IVCF-20 and their characteristics.

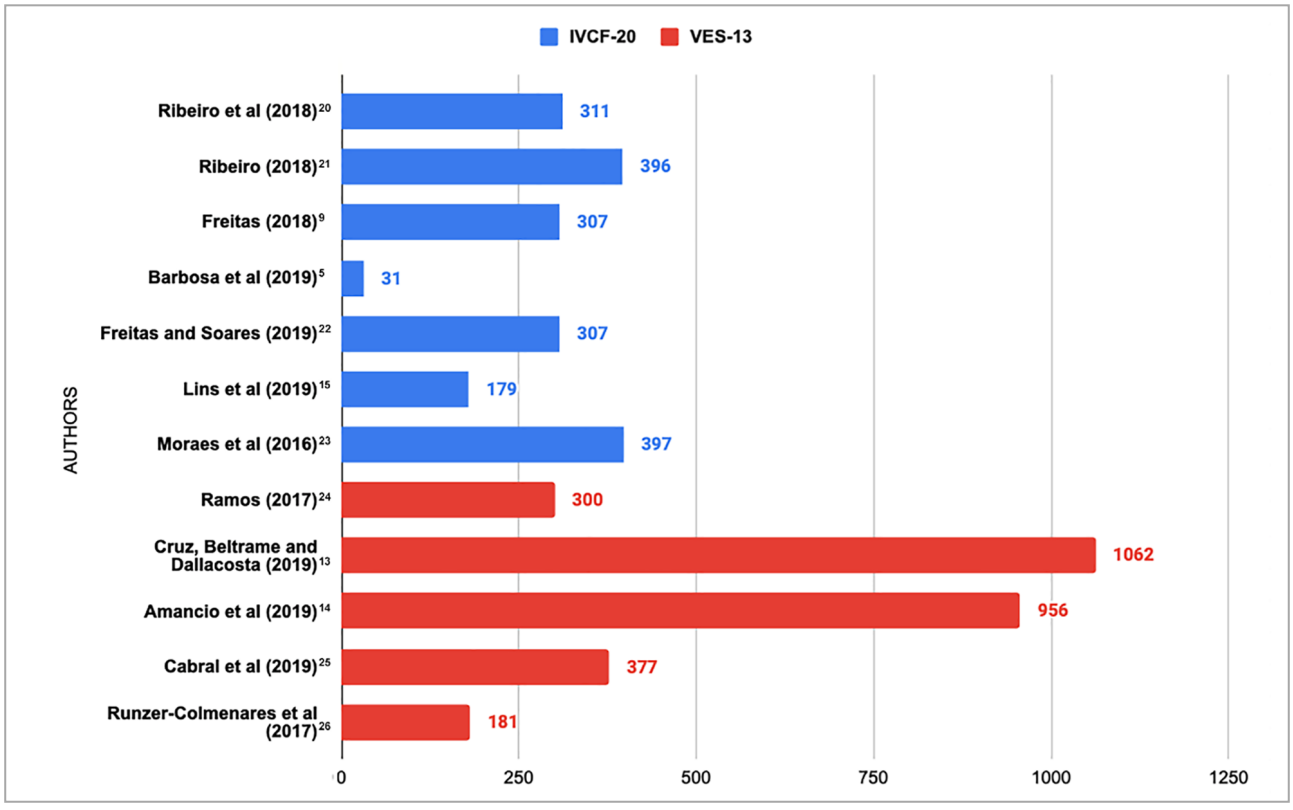
Author, Year	Age	Population	City	Methodology	Title
Ribeiro et al. (2018)[20]	Equal to or over 60 years old	Primary healthcare	Belo Horizonte, Minas Gerais, Brazil	Epidemiological, retrospective	*Autopercepção de saúde e vulnerabilidade clínico-funcional de idosos de Belo Horizonte/Minas Gerais*
Ribeiro (2018)[21]	Equal to or over 60 years old	Family healthcare staff and/or in Community Healthcare Agents Program	Belo Horizonte, Minas Gerais, Brazil	Methodological, analytic with a quantitative approach	*Análise psicométrica do índice de vulnerabilidade clínico funcional 20*
Freitas (2018)[9]	Equal to or over 65 years old	Basic Healthcare Units	Pombal, Paraíba, Brazil	Crosscut analytic-correlational	*Fatores associados à fragilidade em idosos do sertão brasileiro no contexto da atenção primária à saúde*
Barbosa et al. (2019)[5]	Equal to or over 60 years old	Caretakers for elders with Alzheimer, registered at the Association for the Study, Research and Support to Patients with Alzheimer	Paraná, Brazil	Crosscut	*Vulnerabilidade clínica e funcional de idosos cuidadores de idosos com doença de Alzheimer*
Freitas e Soares (2019)[22]	Equal to or over 65 years old	Basic Healthcare Units	Pombal, Paraíba, Brazil	Crosscut	*Índice de vulnerabilidade clínico-funcional e as dimensões da funcionalidade em idosos*
Lins et al. (2019)[15]	Equal to or over 60 years old	Family Healthcare Units	Recife, Pernambuco, Brazil	Quantitative with a Crosscut	*Risco de fragilidade em idosos comunitários assistidos na atenção básica de saúde e fatores associados*
Moraes et al. (2016)[23]	Equal to or over 60 years old	Referral Center for the Elderly from the Clinic Hospital at the Federal University of Minas Gerais, and in the community	Belo Horizonte, Minas Gerais, Brazil	Crosscut	*Índice de Vulnerabilidade Clínico Funcional-20 (IVCF-20): reconhecimento rápido do idoso frágil*

Source: Authors (2022).

Chart 2. Description of articles with the VES-13 instrument and their characteristics.

Author, Year	Age	Population	City	Methodology	Title
Ramos (2017)[24]	Not mentioned	Hospitalized	Porto, Portugal	Flowchart of the advanced glocalization algorithm	*AGE – Avaliação Geriátrica Estruturada: Um Projeto de Melhoria da Qualidade no Serviço de Medicina Interna*
Cruz (2019)[13]	Equal to or over 60 years old	Public health services	Palmas, Paraná, Brazil	Quantitative with crosscut	*Envelhecimento e vulnerabilidade: análise de 1.062 idosos*
Amancio et al. (2019)[14]	Equal to or over 60 years old	Vaccination centers	Distrito Federal, Brazil	Quantitative with crosscut	*Fatores que interferem na condição de vulnerabilidade do idoso*
Cabral et al. (2019)[25]	Equal to or over 60 years old	Family Healthcare Teams	Várzea Grande, Mato Grosso, Brazil	Crosscut outline	*Vulnerabilidade e fatores associados em idosos atendidos pela Estratégia Saúde da Família*
Runzer-Colmenares et al. (2017)[26]	Equal to or over 60 years old	Geriatric Service at the Medical Naval Center in Peru	El Callao, Peru	Longitudinal cut	*Fragilidad y vulnerabilidade como predictores de radiotoxicidad en adultos mayores: un estudio longitudinal en Perú*

Source: Authors (2022).



Graphic 1. Sample of the number of participants in each study.
Source: Authors (2022).

In Chart 3, we can see an overview of the psychometric properties of each article, where 7 utilized the IVCF-20, and 5 used the VES-13 to evaluate frailty. The articles that presented the highest evaluation of the psychometric domains were Moraes et al. (2016)[23] e Cabral et al. (2019)[25]. Moraes et al. (2016)[23], evaluated IVCF-20, and they had 8 out of 9

possible domains explored. Cabral et al. (2019)[25] evaluated VES-13, and they had 5 out of 9 domains explored. None of the articles evaluated the transcultural validity.

The internal consistency was evaluated in 4 out of 12 articles, predominantly all of them were about the IVCF-20 instrument. The structural validity and the criteria validity were the measurement properties more widely evaluated, being presented in 7 out of 12 articles. As for the equivalence reliability, it was the least evaluated measurement property in all 12 articles.

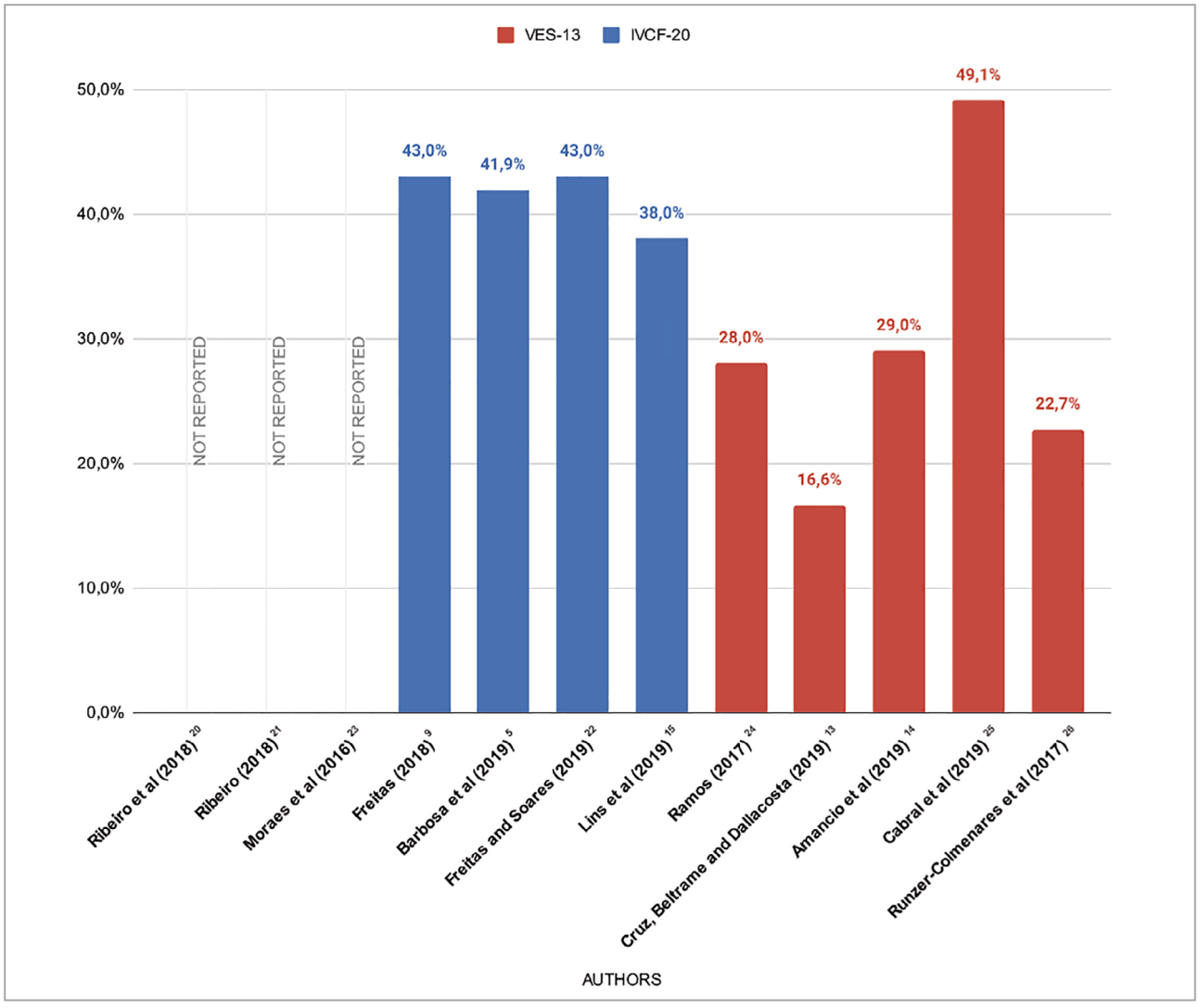
Discussion

It can be observed the necessity of identifying the frailty and vulnerability levels of the elder to establish a better approach for treatment and improvements in the life quality of the individual and of the group they represent. It cannot be ignored that frailty is a progressive condition that can be avoided and that the individual can be rehabilitated from.

In this review, we evaluated 12 scientific articles discussing the instruments IVCF-20 and VES-13, which were essential for the evaluation of frailty among the elderly. However, it is essential to be aware of the choice of the most adequate and precise instrument, in order to guarantee the quality of the results. Therefore, it is necessary to know those instruments in detail, understanding their domains, evaluation forms, and particularly their psychometric properties before using them.

We opted to list measures explicitly quoted by the authors, not allowing interpretation of external data or analysis on a subjective level. The measure properties, validity, and reliability are not completely independent. Researchers affirm that an unreliable instrument cannot be valid, nonetheless, a reliable instrument can, sometimes, lack validation. Hence, high reliability does not guarantee the validity of the instrument[19].

We also observed the prevalence of articles debating about the IVCF-20 instrument, in the case, 07 out of 13. It is believed that its prevalence is due to its creation and development in Brazil, matching the profile of primary healthcare, which enables it to be used by all healthcare professionals.



Graphic 2. Sample of the frailty risk found in each article.
Source: Authors (2022).

Chart 3. Evaluation of the articles according to their psychometric properties.

INSTRUMENTS	AUTHORS	RELIABILITY			VALIDITY			OTHER CRITERIA		
		Internal Consistency	Stability	Equivalence	Content	Structural	Criteria	Sensibility	Specificity	Predictive Value
IVCF-20	Ribeiro et al. (2018)[20]	■				■				
	Ribeiro, (2018)[21]	■	■			■	■			
	Freitas (2018)[9]					■	■			
	Barbosa et al. (2019)[5]	■					■			
	Freitas e Soares (2019)[22]									
	Lins et al. (2019)[15]					■	■			
	Moraes et al. (2016)[23]	■		■	■	■	■	■	■	■
VES-13	Ramos (2017)[24]									
	Cruz et al. (2019)[13]				■	■				
	Amancio et al. (2019)[14]		■							
	Cabral et al. (2019)[25]		■				■	■	■	■
	Runzer-Colmenares et al. (2017)[26]					■	■			

■ IVCF-20 Instrument ■ VES-13 Instrument
Source: Authors (2022).

Another point worth mentioning is that from all articles analyzed throughout this review, the one which presented the highest evaluation of the psychometric domains was an IVCF-20 study, the one written by Moraes et al., (2016)[23]. This suggests a possible advantage of quality in the use of this instrument, following the criteria and the sample used.

In a systematic review study, Faller et al. (2019)[12] observed that no instrument was examined in all domains, regarding the reliability and validity, which was noted in this study. Most articles analyzed presented a better validity index than the reliability index. Moreover, it was punctuated the necessity for bigger studies to validate the instruments.

As for the risk of frailty, we obtained a variety of results, mainly in the studies that utilized VES-13. Amancio et al. (2019)[14] reported that the 1% increase in the income of the elderly resulted in a reduction of 0.27 in the VES-13 score, thus compromising its early detection.

Yet, it was observed that most of the studies defined an interviewer (doctor, nurse, or another team member), a minimum age of 60 years old, and an execution time (either long or short). They also mobilized a scientific community in the search for a definition of frailty and of a robust instrument capable of measuring and tracking it[12].

Some limitations were found regarding the inclusion criteria for a very specific population, and in some studies they did not assess the reliability and validation of the instrument used.

The second point of limitations has to do with the difficulty in obtaining a more significant sample, where only articles available for free in full were evaluated, and the bibliographic survey was carried out in three databases with the following criteria: language in Portuguese and Spanish, which represents a limitation, as there could be important manuscripts that are not freely available and that could modify the result found. All these factors contributed to limitations of the study and, certainly, a more significant and representative sample would allow for greater external validity.

The strength of this study includes that the instruments presented can provide a new way of seeing what the main implications for applicability are. Obviously, the choice of instrument adopted will influence the strength of the best strategy capable of reconciling, respectively, high sensitivity and high specificity, as a way of optimizing the use of health resources. However, throughout this study, we identified issues that would allow us to understand that choosing the appropriate instrument to assess frailty is not simple, given the lack of global consensus on the definition of the syndrome.

Conclusion

In conclusion, this study confirmed that the instruments are great allies of clinical practice, as they allow a multidimensional assessment of the elderly, and can guide decisions, as well as optimizing the evaluation time. Emphasizing that such instruments are an important tool to assess and/or stratify the health of the elderly population in an early way, identifying the elderly: robust, pre-frail and frail, as well as their functional clinical classification, enabling adequate and centered on the elderly, thus proposing an individualized care plan, which guides which users need a more in-depth assessment, avoiding unnecessary interventions, examinations and hospitalizations, reducing costs and effectively promoting the health of the elderly, avoiding functional and improving its functionality.

Authors' Contribution

Conceptualization, Research, Methodology, Visualization & Writing – Analysis and Editing: Noele Benchaya Castro Italiano; Conceptualization, Methodology, Analysis and Editing, Project Management, Supervision & Writing – Original Draft: Vanusa do Nascimento; Visualization, Writing – Original Draft, Writing – Proofreading and Editing: Julia de Oliveira Simão; Visualization, Writing – Original Draft, Writing – Proofreading and Editing: Fátima Helena do Espírito Santo; Visualization, Writing – Original Draft, Writing – Proofreading and Editing: Maria de Nazaré de Souza Ribeiro.

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