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REAS

SCOPING REVIEW

Nutritional assessment methods for people living with HIV/AIDS: a scoping review

Métodos de avaliação nutricional em pessoas vivendo com HIV/AIDS: uma revisão de escopo

Métodos de evaluación nutricional para personas que viven con el VIH/SIDA: una revisión del alcance

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ABSTRACT

Objective: To identify and describe methods to assess the nutritional status of people living with HIV/AIDS (PLWHA). **Methods:** A scoping review was carried out in the PubMed, Embase, Scopus, Lilacs, SciELO, BVS databases in October 2021. Original articles assessing the nutritional status of PLWHA, in Portuguese, English and Spanish, were included. **Results:** The review covered 19 studies published between 1999 and 2021. The nutritional assessment methods found were Anthropometry, Thumb Adductor Muscle Thickness (TAMT), Hand Grip Strength (HGS), Bioimpedance, Subjective Global Assessment (SGA), Malnutrition Universal Screening Tool (MUST), Nutritional Risk Screening (NRS-2002), Mini Nutritional Assessment (MAN), Biochemical Assessment and Food Consumption. **Conclusion:** Given the lack of a gold standard, the combination of nutritional assessment methods is a good strategy to diagnose the nutritional status of PLWHA, enabling better conditions for nutritional management in this population.

Descriptors: HIV; Acquired Immunodeficiency Syndrome; Nutrition Assessment.

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RESUMO

Objetivo: Identificar e descrever métodos para a avaliar o estado nutricional em pessoas vivendo com HIV/AIDS (PVHA). **Métodos:** Realizou-se uma revisão de escopo nas bases PubMed, Embase, Scopus, Lilacs, SciELO, BVS em outubro 2021. Foram incluídos artigos originais que avaliassem o estado nutricional de PVHA, em português, inglês e espanhol. **Resultados:** A revisão abrangeu 19 estudos publicados entre 1999 e 2021. Os métodos de avalição nutricional encontrados foram Antropometria, Espessura do Músculo Adutor do Polegar (EMAP), Força do Aperto de Mão (FAM), Bioimpedância, Avalição Global Subjetiva (AGS), *Malnutrition Universal Screening Tool* (MUST), *Nutritional Risk Screening (*NRS-2002), Mini Avaliação Nutricional (MAN), Avaliação Bioquímica e Consumo Alimentar. **Conclusão:** Tendo em vista a inexistência de um padrão ouro, a combinação de métodos de avaliação nutricional é uma boa estratégia para diagnosticar o estado nutricional em PVHA, possibilitando melhores condições de manejo nutricional dessa população.
Descritores: HIV; Síndrome da Imunodeficiência Adquirida; Avaliação Nutricional.

RESUMEN

Objetivo: Identificar y describir métodos para evaluar el estado nutricional de las personas que viven con VIH/SIDA (PVVS). **Métodos**: Se realizó una revisión de alcance en PubMed, Embase, Scopus, Lilacs, SciELO, BVS en octubre de 2021. Se incluyeron artículos originales que evaluaron el estado nutricional de las PVVS, en portugués, inglés y español. **Resultados:** La revisión abarcó 19 estudios publicados entre 1999 y 2021. Los métodos de evaluación nutricional encontrados fueron Antropometría, Grosor del músculo aductor del pulgar (AMAP), Fuerza del apretón de manos (FAM), Bioimpedancia, Evaluación global subjetiva (SGA), Herramienta de detección universal de malnutrición (MUST), Cribado de Riesgo Nutricional (NRS-2002), Mini Valoración Nutricional (MAN), Valoración Bioquímica y Consumo de Alimentos. **Conclusión:** Ante la falta de un estándar de oro, la combinación de métodos de evaluación nutricional es una buena estrategia para diagnosticar el estado nutricional de las PVVS, posibilitando mejores condiciones para el manejo nutricional de esta población.
Descriptores: VIH; Síndrome de Inmunodeficiencia Adquirida; Evaluación Nutricional.

INTRODUCTION

Human immunodeficiency virus (HIV) infection is now considered a chronic disease due to advances in antiretroviral therapy (ART) in recent years. There has been a decrease in the prevalence of opportunistic diseases, inherent complications of acquired immunodeficiency syndrome (AIDS) and an increase in the prevalence of cardiovascular disease and other comorbidities, including complications typically associated with ageing. [1]

These pharmacological advances have also had their repercussions on the nutritional status of people living with HIV/AIDS (PLWHA), leading to an increase in the prevalence of eutrophy and overweight in those patients taking ART, with changes in the lipid profile and body fat distribution, and the prevalence of malnutrition, especially in those not adhering to treatment and hospitalized. [2,3]

Knowing the nutritional status of PLWHA, both in outpatient and inpatient settings, is essential for better management of the nutritional status of this population, enabling early interventions and, among other things, improving their quality of life. [4] To this end, it is necessary to choose the most appropriate nutritional assessment method possible. Considering that there are various methods of assessing nutritional status and that there is no definition of these methods specifically for PLWHA, the aim of this scoping review was to identify and describe which methods of assessing nutritional status are used in people living with HIV/AIDS.

METHOD(S)

This scoping review was prepared in accordance with the methodology recommended by the Joan Briggs Institute. [5] This is a synthesis in which the mapping seeks to understand a topic in a broad and in-depth way. [6]

The scoping review stages were followed: 1) identification of the research question and objective; 2) identification of relevant studies; 3) selection of studies; 4) data mapping; 5) summarization and presentation of results. [5]

The research question was drawn up according to the mnemonic combination PCC. [6] P: population - people living with HIV/AIDS; C: concept - nutritional assessment methods; C: context - hospital and outpatient settings. The following guiding question was established: what methods are used to assess the nutritional status of people living with HIV/AIDS in hospital and outpatient settings?

The refinement of the articles was based on the eligibility criteria, and the following inclusion criteria were considered:

primary studies available in full that assess the nutritional status of adults and elderly people living with HIV/AIDS, as well as theses, texts, opinions, text and opinion articles, in English, Portuguese and Spanish, with no time limitation. The searches were carried out in the PubMed, Embase, Scopus, Latin American and Caribbean Center on Health Sciences (Lilacs), Scientific Electronic Library Online (SciELO) and VHL Regional Portal (BVS) databases.

The following controlled descriptors were selected using terminology recommended by the *Medical Subject Headings* (MeSH) and/or the Health Sciences Descriptors (DeCS): HIV, AIDS, Nutritional Assessment. All these terms were searched for in their English and Spanish equivalents. The search strategy was (avaliação nutricional) OR (nutrition assessment) OR (evaluación nutricional) AND (HIV) OR (VIH) OR (virus da imunudeficiência humana) OR (Human Immunodeficiency Virus) AND (AIDS) OR (Síndrome de Imunodeficiência Acquirida) OR (Acquired Immunodeficiency Syndrome). This strategy was adapted for all the databases used, and carried out in October 2021.

The studies were pre-selected by reading the titles and abstracts, and the final sample was reached by reading the full articles, according to the flowchart shown in Figure 1.

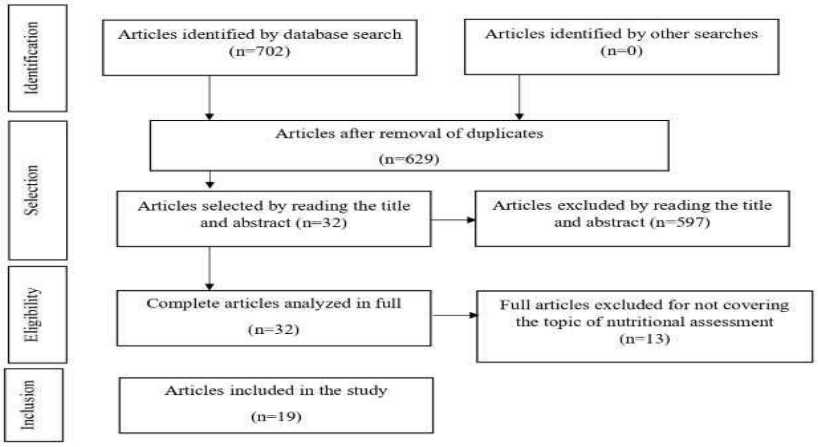

Figure 1: Authors.

Data extraction was carried out independently by two reviewers using a pre-formatted Microsoft Excel® spreadsheet. The following information was extracted from the studies: title, year of publication, authors, journal, location, design, objective, sample, nutritional assessment method used, context of the population studied and results.

To summarize the results, a descriptive analytical structure was used to examine each article. A table with the main characteristics of the papers was drawn up in order to provide an overview of all the material**.** There was also a thematic description organized according to the nature of the studies (types of nutritional assessment).

RESULTS

After the evaluation process, the articles in this scoping review were published between 1999 and 2021. Table 1 shows the main characteristics of the studies and then presents the types of nutritional assessment used in people living with HIV/AIDS: Anthropometry, Adductor Thumb Muscle Thickness (APME), Handshake Strength (HFS), Bioimpedance, Subjective Global Assessment (SGA), *Malnutrition Universal Screening Tool* (MUST), *Nutritional Risk Screening (*NRS-2002), Mini Nutritional Assessment (MNA), Biochemical Assessment and Food Consumption.

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Chart 1 - Characterization of articles according to author/year of publication, journal, country of study and types nutritional assessment methods. 2021.

Title	Author/Year of publication	Country	No. of participants	Nutritional Assessment Methods
Nutritional risk and nutritional status in hospitalized older adults living with HIV in Shenzhen, China: a cross-sectional study.	(LIU et al., 2021) .	China	196	-Anthropometry -NRS-2002 -Biochemistry
Is handgrip strength a good nutritional assessment method for people living with HIV?	(ELARRAT et al., 2020) .	Brazil	242	-Anthropometry -AGS -FAM
Prevalence of malnutrition and associated factors among adult patients on antiretroviral therapy follow-up care in Jimma Medical Center, Southwest Ethiopia.	(DAKA; ERGIBA, 2020) .	Ethiopia	1062	-Anthropometry
Nutritional indicators in HIV/AIDS patients: outpatient and inpatient reality.	(SURUAGY CORREIA MOURA, 2018) .	Brazil	86	-Anthropometry -Biochemistry
Subjective global assessment versus anthropometric assessment of HIV patients.	(OLIVEIRA et al., 2018)	Brazil	30	-Anthropometry -AGS
Association between different methods of nutritional assessment in HIV/AIDS patients in a public hospital.	(COSTA et al., 2017)	Brazil	30	-Anthropometry -AGS -NRS-2002 -MUST
Adductor pollicis muscle as a nutritional assessment tool in patients with human immunodeficiency virus.	(NEVES et al., 2016)	Brazil	48	-Anthropometry -AGS -EMAP
Nutritional Profile of HIV Positive Patients in	(GOMES; LOURIVAL,	Brazil	11	-Anthropometry -Food Consumption

the Municipality from Apucarana (PR).	2016)			
Nutritional assessment of people with HIV/AIDS.	(MASSIP N et al., 2015)	Cuba	87	-Anthropometry -Biochemistry -Food Consumption
Anthropometric and nutritional profile of people living with HIV and AIDS in India: An Assessment.	(ANAND; PURI, 2014)	India	400	-Anthropometry -MAN -Food Consumption
Nutritional status and dietary profile of patients assisted by the STD/AIDS and Viral Hepatitis program of a Health Center in Itaperuna-RJ.	(LADEIRA, 2012)	Brazil	37	- Anthropometry -Food Consumption
Prevalence and characteristics associated with malnutrition at hospitalization among patients with acquired immunodeficiency syndrome in Brazil.	(ANDRADE et al., 2012)	Brazil	127	-Anthropometry
Malnutrition in hospitalized people living with HIV/AIDS: evidence from a cross-sectional study from Chengdu, China.	(HU et al., 2011)	China	94	-Anthropometry -MUST -AGS -Food Consumption
Nutritional and clinical status and dietary pattern of people living with HIV/AIDS in outpatient care in the city of São Paulo.	(SILVA et al., 2010)	Brazil	312	-Anthropometry -Food Consumption
Nutritional and metabolic assessment of HIV patients on antiretroviral therapy in northeastern Brazil.	(BRAGA; SILVA, 2010)	Brazil	70	-Anthropometry
Different nutritional-state indicators of HIV-positive individuals undergoing antiretroviral therapy.	(GERAIX; CARVALHAES; PEREIRA, 2008)	Brazil	94	-Anthropometry -Biochemistry
Nutritional status in	(STAMBULLI	Argenti	43	- Anthropometry

patients with HIV infection and AIDS.	AN; FELIU; SLOBODIANIK, 2007)	na		-Biochemistry
Prevalence of overweight and abdominal obesity in HIV/AIDS patients taking high-potency antiretroviral therapy.	(JAIME et al., 2004)	Brazil	223	- Anthropometry
Comparison of methods for assessing nutritional status in HIV-Infected adults.	NIYONGABO et al., 1999.	Brazil	88	-Anthropometry -Bioimpedance -AGS

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Anthropometry

Anthropometry is a portable, universally applicable, inexpensive and non-invasive technique for assessing the size, proportions and composition of the human body, reflecting nutritional and health status, and is capable of predicting the performance, health and survival of populations. Anthropometric measurements are evaluations carried out directly on the individual, at some anatomical point, or on the body surface as a whole. The combination of these measurements generates anthropometric indices, which are used to generate nutritional indicators.[7] Anthropometry requires standardization of the measurement technique used by anthropometrists and the instruments used in the assessment. [8]

Typically, the simplified two-component model is used: body fat and fat-free weight, measured by anthropometric measurements such as weight, height, skinfolds (or folds), circumference (or perimeter), generating indices such as Body Mass Index (BMI), Waist Hip Ratio (WHR), Body Fat Percentage (BFP). [9,10]

Thickness of the Adductor Muscle of the Thumb (EMAP)

Some authors[12] proposed the measurement of the Thickness of the Adductor Muscle of the Thumb as a method of nutritional assessment. The authors suggest that it is a simple, non-invasive, low-cost technique. As the adductor pollicis muscle is flat and is fixed between two bone structures, it is the only muscle that can be measured directly and does not require equations or adjustments to estimate its real value. This makes it stand out among the different anthropometric measures used to assess muscle mass, and it also suffers minimal interference from subcutaneous fat. Energy catabolism and nutritional deficits in malnourished individuals lead to a reduction in PASM, which can also atrophy as a result of physical inactivity. [11,12]

EMAP has been increasingly studied as a nutritional parameter, both in healthy and sick people, and is a potentially useful technique for detecting early changes related to malnutrition, as well as helping with nutritional surveillance. [13,14]

Force of Handshake (FAM)

Hand Grip Strength (HSF), assessed by dynamometry, measures muscle strength. Considered a reliable, simple, fast and non-invasive method, HGS is constantly growing in use in clinical practice to identify malnutrition. This technique can detect functional changes in short periods of time before anthropometric and biochemical changes occur. [15,16]

Bioimpedance

Bioimpedance or bioelectrical impedance analysis (BIA) is a technique used to measure body composition based on the body's electrical conductive properties involving the measurement of impedance (Z) to the flow of a low electrical current (800 μA). The devices can be single-frequency, when they only operate at a frequency of 50 kHz, or multi-frequency. The use of low frequencies (~ 1 kHz) allows extracellular evaluation, while higher frequencies (500 to 800 kHz) allow the current to penetrate the cell and pass through the intracellular fluid. [9,17]

The principle of BIA is that lean tissue, consisting of water and electrolytes, is a good electrical conductor, while fat, which has no water, is a poor conductor. It is possible to measure fat mass, fat-free mass, total body water, and in some devices intra- and extra-cellular water, skeletal muscle mass and body cell mass. Possible sources of error in BIA are differences in limb length, physical activity, nutritional status, hydration level, ovulation and device operation. [17]

Subjective Global Assessment (SGA)

Standardized by Detsky et al. (1987), the Global Subjective Assessment (GSA) initially aimed to assess the nutritional status of surgical patients, dividing them into (A) well-nourished, (B) moderately malnourished and (C) severely malnourished. [18] Due to its good sensitivity and specificity in predicting post-operative infections, the GSA has been reformulated and applied to specific groups in order to increase its reproducibility and predictive values. [19-21]

It is a simple, low-cost tool that can be applied by health professionals who have received prior training. [2.2] AGS is a method that encompasses subjective and objective aspects of nutritional status, including components of clinical history and physical examination. In the clinical history, weight loss in the last six months, weight change in the last two weeks (increase, maintenance or decrease), change in food intake (consistency of diet and quantity), persistent gastrointestinal symptoms in the last two weeks (nausea, vomiting, diarrhea and anorexia), change in functional capacity, relationship between diseases and nutritional needs should be observed. On physical examination, the examiner should note loss of subcutaneous fat, loss of muscle mass, sacral and ankle edema and ascites. [18]

Nutritional Screening Tools (MUST, NRS-2002 and MNA)

In order to provide guidelines for detecting malnutrition or the risk of developing malnutrition, the European Society for Clinical Nutrition and Metabolism (ESPEN) recommends the use

of nutritional screening tools according to each population. [23]

The Malnutrition Universal Screening Tool (MUST) is a validated instrument [24] for use in adults in hospital and outpatient settings with the aim of detecting malnutrition based on the association between impaired nutritional status and functionality. The MUST is a questionnaire made up of questions involving BMI, unintentional weight loss, the presence of acute illnesses and decreased food intake. A score is calculated according to the answers and patients are classified as: low risk (0 points), medium risk (1 point) and high risk (2 or more points). [23]

*Nutritional Risk Screening (*NRS-2002) has had its predictive validity documented [25] , and aims to screen for malnutrition in adults and the elderly in a hospital environment. The questionnaire consists of questions related to BMI, unintentional weight loss, changes in food intake and severity of illness. The second part is carried out if at least one positive response is identified in the first part of the screening. It is classified as: absent (score 0), mild (score 1), moderate (score 2), severe (score 3), obtaining a total score from 0 to 6. Patients aged 70 or over must be added one more point. Patients with a total score ≥3 are classified as being at nutritional risk. [23]

The Mini Nutritional Assessment (MNA) is an instrument developed for elderly people at risk of malnutrition. Its predictive validity has been assessed by demonstrating its association with adverse health effects. [26]

The MAN consists of two parts, screening and assessment. In the first part, the questions are related to assessing food intake, unintentional weight loss, mobility, the presence of psychological stress or recent acute illness, neurological changes and BMI. In the assessment part, questions involving place of residence, medication, presence of injuries, eating habits, anthropometric measurements, autonomy to eat and self-assessment of health and nutrition are addressed. Elderly people who score more than 24 points are considered to have adequate nutritional status, those at nutritional risk score between 17 and 23.5, and those who score less than 17 are considered to be malnourished. [27]

Biochemical evaluation

Biochemical assessment of PLWHA should take into account the metabolism of macro and micronutrients and the impact of antiretroviral therapy (ART), as well as metabolic alterations and the presence of opportunistic diseases. To aid nutritional diagnosis, the most commonly used parameters are: blood count (hematocrit,

hemoglobin), urea, creatinine, glutamic-oxalacetic transaminase (GOT), glutamic-pyruvic transaminase (GPT), total protein and fractions, calcium, vitamin D, C-reactive protein (CRP), vitamin B12, serum iron, uric acid. Measurements of total cholesterol and fractions, triglycerides and glycemia are indicated for monitoring carbohydrate and lipid metabolism. [28,29]

Albumin alone is not capable of determining the presence or absence of malnutrition, but can be associated with acute phase protein (CRP) as an independent predictor of morbidity and mortality, through the CRP/Albumin index, as well as being used to conduct and monitor nutritional therapy through the albumin/globulin ratio. [29-31]

Food Consumption

The most commonly used instruments for assessing food consumption are 24-hour dietary recalls and quantitative or semi-quantitative food frequency questionnaires. These instruments are capable of verifying macro and micronutrient intake, as well as helping to identify allergies, intolerances, aversions and food preferences. [28,29]

DISCUSSIONS

Anthropometry is a widely used method, both in outpatient and inpatient settings. All the studies in this review used BMI as a parameter for assessing nutritional status. However, it is known that BMI is a global assessment, where there is no differentiation between muscle and fat mass, so there is a need for complementary assessments for a more accurate nutritional diagnosis. [8] Some studies have used anthropometry through circumference and skinfold measurements to assess fat mass composition, muscle mass preservation and risk of increased cardiometabolic diseases to assess the nutritional status of PLWHA. [2,32-42]

In addition to standardized techniques for an adequate and accurate anthropometric assessment, there have been some limitations to this method, such as the presence of oedema and restriction to the patient's bed, which make it difficult to carry out some anthropometric measurements [43], so other alternatives are needed. Within anthropometry, we still have the Thickness of the Adductor Muscle of the Thumb (TEMT) as a promising tool for nutritional diagnosis. [13] In their work with adults and elderly people living with HIV/AIDS, Neves et al. (2016) showed that the TEMT measurement of the left hand can be used, in association with other nutritional assessment tools, to diagnose malnutrition. [39]

With regard to preserving muscle mass, Hand Grip Strength (HSF) has also been used to assess the nutritional status and

clinical monitoring of PLWHA, showing a relationship between HSF and muscle mass in this population. [35]

Still on the subject of analyzing body composition in PLWHA, studies have shown that bioimpedance (BIA) can also be an alternative. Some authors[40] showed that body cell mass obtained by BIA analysis can detect malnutrition at an early stage, preventing wasting syndrome in PLWHA. [40]

Nutritional screening instruments are capable of indicating individual nutritional risk. A work[34] showed that both the MUST and the NRS-2002 are reliable alternatives for diagnosing malnutrition in hospitalized adults with HIV/AIDS. [34] Reliability results were also demonstrated by a work[44], indicating the use of the NRS-2002 as a routine for assessing nutritional risk in hospitalized PLWHA. [44] On the other hand, another study[32] showed a 50% prevalence of nutritional risk and 34% of malnutrition using the MUST, despite the fact that the sample was made up of adults and the tool is indicated for use in the elderly. [32]

Subjective Global Assessment (SGA) is considered both a screening tool and a nutritional status assessment tool. [9] Some authors[21] conducted a study comparing nutritional assessment using BMI and SGA in PLWHA, where the results showed that not all patients who had a normal BMI had a diagnosis of being well-nourished on SGA.[21] A higher prevalence of malnutrition using SGA was also shown by some authors[45], when compared to BMI assessment in this same population. [45] Some authors[40], on the other hand, described the SGA index as a simple subjective classification that could be used to determine indications for nutritional support. [40]

When it comes to biochemical assessment, studies have shown a high prevalence of malnutrition based on albumin and prealbumin indices. [2,44] In the study by some authors[46] there was an increase in fibrinogen and a tendency towards a decrease in prealbumin levels; however, the authors warn that the nutritional status of HIV-infected patients is different at different stages of the disease.[46] Biochemical assessment is of great value for targeting changes in nutritional status, quickly establishing effective and comprehensive therapeutic measures, and should be used in conjunction with other methods of assessing nutritional status. [36,38,44,46]

Finally, food consumption as a method of nutritional assessment has shown that excess weight in patients with good eating habits may be associated with antiretroviral therapy.[37] That there may be differences in the food consumption of people with HIV and those who have developed AIDS, the latter being more prevalent in inadequate eating behaviors. [38] The low intake of

proteins and energy [32,45] and the high consumption of fat [41] may be a cause of the decline in nutritional health in this population. And that the socio-economic status of these people should be taken into account, since the level of education and income can be considered determining factors in decisions regarding the choice and consumption of healthy foods. [47]

CONCLUSIONS

This scoping review showed that there are several ways of assessing the nutritional status of PLWHA, and that the choice will depend on the tools available, the patient's clinical condition and the contexts, both outpatient and inpatient.

However, screening/assessment tools that take into account multiple parameters seem to be good choices for nutritional screening, enabling early diagnosis and interventions. While there is no gold standard on the best method for measuring nutritional status, a combination of nutritional assessment methods is characterized as a good strategy for diagnosing nutritional status in PLWHA, enabling better conditions for nutritional management of this population and optimization of care.

The study evaluated the existing literature. There may be some limitations to this process, since there is probably research published in other languages and on indexing databases not included in the search method of this study. Likewise, the authors recognize that important published research may have been omitted using our search strategy, however the data is relevant to guide future evaluations with this population.

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