Metabolic Syndrome: conceptual analysis in the nursing context

Objective: to analyze the metabolic syndrome concept and to identify its essential features, antecedents, and outcomes within the context of nursing. Method: conceptual analysis, based on the methodological steps of a model. We carried out an integrative review by accessing four databases online: Medical Literature Analysis and Retrieval System Online, Scientific Electronic Library Online, Latin American and Caribbean Health Sciences Literature, and Índice Bibliográfico Español en Ciencias de la Salud. Results: the essential features most frequently involved the diagnostic criteria of metabolic syndrome. Inadequate nutrition and physical inactivity were highlighted as the most common antecedents of the syndrome, and the outcomes were occurrences of cardiovascular disease and diabetes mellitus type 2. As implication, we highlight relevant empirical data to the broad definition of the concept. Conclusion: we could analyze the concept under study regarding essential features, antecedents, and outcomes, operationally defining it as a potential nursing phenomenon, which demands health care focusing on reducing risks and morbidity and mortality for cardiovascular diseases.

Descriptors: Nursing; Concept Formation; Metabolic Syndrome; Risk Factors; Risk; Cardiovascular Nursing.
Introduction

The metabolic syndrome has drawn the attention of the scientific and professional community, not only due to the impact of each of their respective components, but mainly due to the high prevalence of cardiovascular risk factors\(^{(1)}\). According to a global estimate there is prevalence between 20 and 25% in the adult population\(^{(2)}\). In Brazil, the prevalence ranges around 9% in the adult and older-adult population, associated with the following variables: sociodemographic (age, education, marital status, and housing), behavioral (self-perception of health), and comorbidities (cerebrovascular accident, overweight, depression), in different ways between the sexes\(^{(3)}\).

This health condition has been widely studied by researchers, with varying criteria and existing definitions for diagnosis, particularities, and prevalence in population and age groups, aiming to discuss the accuracy of its assumptions\(^{(4-5)}\) and possible parameters that may be related such as neck circumference\(^{(6)}\) and presence of Acanthosis nigricans\(^{(7)}\).

This syndrome was officially and primary described by Gerald Reaven in 1988, and was named “Syndrome X,” which comprised insulin resistance, hypertension, dyslipidemia, and diabetes mellitus, and did not include obesity, currently considered one of the basal pathogenic factors\(^{(8,9)}\). Other concepts used to characterize it are mentioned such as insulin resistance syndrome, new world syndrome, plurimetabolic syndrome, deadly quartet syndrome, and dyslipidemia syndrome\(^{(10)}\).

Likewise, concerning the definition, the metabolic syndrome concept, currently accepted, is nonuniform on health literature, whether national\(^{(10)}\) or international\(^{(11)}\), which evidences the understanding of disease or disorder, even though publications\(^{(12,13)}\) spread the understanding that it is a set of cardiovascular risk factors. Hence, we highlight a gap in the knowledge about the idea that a broader definition for the metabolic syndrome concept would favor the development of health care in practice, teaching, and research, through innovative approaches\(^{(12)}\), by inserting nursing care in such.

Within the context of nursing, risk factors that compose the syndrome refer to the field of performance of the discipline, such as the measurement of waist circumference, blood pressure, and evaluation of laboratory parameters\(^{(14)}\), in order to comprise a nursing phenomenon, for which research should be developed to introduce new and relevant knowledge such as the analysis of the concept and applicability as human responses to inadequate life habits. Therefore, our objective was to analyze the metabolic syndrome concept and to identify its essential features, antecedents, and outcomes within the context of nursing.

Method

This is a conceptual analysis, based on the methodological steps of the Walker and Avant’s Model\(^{(15)}\), covering the process of clarification of meanings of terms and their respective definition, in such a way that researchers and readers share a common language, especially, when a concept requires “clarification,” as stated by the authors of the model, with improved definition for research, development of theories, or the clinical practice of nursing.

Six out of eight steps of the model were developed\(^{(15)}\): selection of the concept; delimitation of the analysis objectives; identification of the uses of the concept in the literature; determination of essential features; identification of antecedents and outcomes of the concept under analysis; and definition of empirical references of the studied concept. We considered these steps, since the study specifically involved the analysis and definition of the metabolic syndrome concept, which we could contemplate without the identification of a case-model and additional cases.

For the selection of the metabolic syndrome concept, we considered such identification in clinical practice and research, as a phenomenon of significant occurrence in people attended by nurses in the context of Primary Health Care. Moreover, since it is a condition that puts individuals at risk of complications, it demands deepening and clarifying the concept, the knowledge produced about the syndrome, and its insertion as a nursing phenomenon, and, thus, in line with the aforementioned model\(^{(15)}\).

This analysis demand is directly related to the purpose of our study, previously presented. In order to achieve it, we question: what is the reason for this concept analysis? Regarding the identification of possible uses of the concept, we searched the literature for synthesis and for understanding how this knowledge is focused or applied, implicitly and explicitly.

In our study, in which we analyzed the concept within the context of nursing, some criteria were deemed relevant for identifying uses in articles: being produced by nurses and or published in nursing journals or related areas; directly contemplating the syndrome, cardiovascular risk factors, and/or overweight and obesity in the content; clearly presenting the concept in the title and or in the development of the article; exposing data relevant to the analysis for composing the concept as a nursing phenomenon; and prioritizing articles with higher level of scientific evidence.
Concerning antecedents, features, and outcomes, the model\textsuperscript{(15)} define them, respectively, as: events that happen a priori to the phenomenon (required for its occurrence); words or expressions that repeatedly emerges in the literature, which demonstrates the essence of the concept; and events or situations that occur a posteriori to the phenomenon, respectively. We drew our attention to the exclusive criterion, according to which something cannot be, at the same time, a feature, an antecedent, and an outcome.

To follow this step, we conducted an integrative literature review, according to the development stages of this type of review in nursing\textsuperscript{(18)}, because we understand the relevance of the systematic and operational approach of this process, in such a way we can achieve results according to our predetermined goal. In the productions selected for the review, we sought the use and definition of the concept, a \textit{sine qua non} for inclusion in the study, besides frequency, adequacy, and direct correlation with the syndrome itself.

Articles were surveyed from a search conducted between March and April 2018, in the databases Medical Literature Analysis and Retrieval System Online (MEDLINE via Pubmed) and Scientific Electronic Library Online (SciELO), accessed through the Portal of Periodicals of the Coordination for the Improvement of Higher Education Personnel Foundation (Coordenação de Aperfeiçoamento de Pessoal de Nível Superior – CAPES) (CAPES), and the Latin American and Caribbean Health Sciences Literature (LILACS) and the Índice Bibliográfico Español en Ciencias de la Salud (IBECS), via Virtual Health Library (VHL). We used the operator “AND” and the following controlled and indexed keywords in the Medical Subject Headings (MeSH) and the Health Sciences Descriptors (DeCS), respectively: “Nursing,” “Metabolic Syndrome X,” “Risk Factors”; and the same words in Portuguese, “Enfermagem,” “Síndrome X Metabólica,” and “Fatores de risco,“ in addition to the uncontrolled descriptor “síndrome metabólica,” [metabolic syndrome] at the time not updated in DeCS.

In this selection, we established the inclusion criteria: full papers electronically available, in English, Portuguese, or Spanish, indexed in the last ten years, on human beings, regardless of age, population group, or correlation with diseases. We excluded from the studies repeated and editorial articles, dissertations, theses, point of views, and case studies. These criteria, in addition to the methodological strictness, were paramount to reduce biases of the study. For the search process and selection of the articles, specifically, we followed the recommendations of the \textit{Preferred Reporting Items for Systematic Reviews and Meta Analyses} (PRISMA)\textsuperscript{(17)} guide, which are detailed in Figure 1.

After the search procedure, we read the titles and abstracts of the selected articles to verify if they met the established inclusion criteria and, later, to read them in full. We used the PICO strategy, representing the acronym for “patients,” “intervention,” “comparison,” and “outcomes”, key elements of the research questions, namely: P – individuals with metabolic syndrome; I – does not apply; C – does not apply; and O – essential features, antecedents, and outcomes.

Extraction of empirical data was performed by the following questions: how authors define the metabolic syndrome concept? Which habits, behaviors, events, situations, and phenomena contribute to the development of the syndrome? What features and peculiarities were mentioned by the authors? What are the consequences of the diagnosis and non-follow-up of the syndrome?

For data collection, we used an instrument previously prepared with the characterization of literature (author, year, database, type of study, and title) and the empirical data of the selected articles (definition, concept, antecedents, essential features, and outcomes). Then, data were coded and distributed into categories and subcategories, whose “essential features” of the syndrome were composed of characteristics related to the contexts of the nursing practice; the “antecedents” and “outcomes” categories were organized into subcategories according to the potential of change or not, and the temporal aspect (short, medium, and long term), based on critical analysis, respectively.

We drew our attention to the direct relationship between the elements and the studied phenomenon, in an analytical, manual, thorough, and exhaustive way of the selected articles, classifying them according to the level of evidence\textsuperscript{(18)}: evidence from systematic review or meta-analysis of relevant, randomized and controlled clinical trials, or from guidelines based on systematic reviews of clinical trials with randomization, controlled (Level I); evidence from at least one clinical trial with randomization, controlled and well-delineated (Level II); evidence from well-defined, controlled studies without randomization (Level III); evidence from cohort studies or case-control studies (Level IV); evidence from systematic review of qualitative and descriptive studies (Level V); evidence from single study, descriptive or qualitative (Level VI); evidence from opinion of authorities or reports of expert committees (Level VII).
Studies identified in each database
IBECS* (n=04)
LILACS† (n=387)
MEDLINE‡ (N=189)
SciELO§ (n=84)

Studies excluded for not meeting the objectives of this study
IBECS* (n=01)
LILACS† (n=293)
MEDLINE‡ (N=145)
SciELO§ (n=54)

Studies included after reading the titles
IBECS* (n=03)
LILACS† (n=94)
MEDLINE‡ (N=44)
SciELO§ (n=30)

Repeated studies
IBECS* (n=00)
LILACS† (n=49)
MEDLINE‡ (N=11)
SciELO§ (n=13)

Studies selected for initial reading
(n=98)

Excluded studies (editorials, dissertations, and point of views)
(n=39)

Studies selected for reading in full
(n=59)

Unavailable studies
(n=23)

Studies used for conceptual analysis
(n=36)

IBECS* (n=03)
LILACS† (n=12)
MEDLINE‡ (N=08)
SciELO§ (n=13)

Note: *IBECS – Índice Bibliográfico Español en Ciencias de la Salud; †LILACS – Latin American and Caribbean Health Sciences Literature; ‡MEDLINE – Medical Literature Analysis and Retrieval System Online; §SciELO – Scientific Electronic Library Online
Source: Adapted17.

Figure 1 – Flowchart of search in the databases. João Pessoa, PB, Brazil, 2018

Finally, empirical references were gathered to create a definition, understood as categories or classes of observable phenomena that demonstrate the occurrence of the concept by an operational definition of such18. Results were critically analyzed and arranged in a table, with absolute and relative frequencies of features, antecedents, and outcomes in relation to the number of publications, in addition to figures. Then, we discussed the state of the art produced in relation to the concept under study and the critical analysis of the evidenced data, in addition to their correlation with nursing.

Our study did not demanded submission to the Research Ethics Committee, since we used literature to analyze the concept, not involving humans, directly or indirectly.

Results

We selected 36 articles produced and/or published by nurses in nursing journals or related areas. These articles mostly involved cross-sectional (n=13) and descriptive (n=9) studies, with Level VI classification of scientific evidence, depicting the profile of nursing productions about the concept under study. In Figure 2 we present the profile of the selected articles, according to title, author, year of publication, type of study, and level of evidence.
Table 2 – Classification of articles included in the analysis of the metabolic syndrome concept. João Pessoa, PB, Brazil, 2018

| TITLE                                                                 | YEAR   | TYPE OF STUDY       | EL* |
|----------------------------------------------------------------------|--------|---------------------|-----|
| Nursing diagnoses of ICNP[58] for people with metabolic syndrome[46] | 2018   | Descriptive         | VI  |
| Anthropometric indicators that predict metabolic syndrome among adolescents[56] | 2018   | Cross-sectional     | IV  |
| Construction and validation of educational materials for the prevention of metabolic syndrome in adolescents[55] | 2017   | Descriptive         | VI  |
| Prevalence of metabolic syndrome in individuals with type 2 diabetes mellitus[21] | 2017   | Cross-sectional     | VI  |
| Lifestyle intervention on metabolic syndrome and its impact on quality of life: a randomized controlled trial[20] | 2017   | Randomized clinical trial | III |
| Risk factors associated with the development of metabolic syndrome in children and adolescents[55] | 2016   | Cross-sectional     | VI  |
| Metabolic syndrome in fixed-shift workers[24]                          | 2015   | Cross-sectional     | VI  |
| Neck circumference as a potential marker of metabolic syndrome among college students[55] | 2014   | Cross-sectional     | VI  |
| Prevalence of metabolic components in university students[26]          | 2014   | Descriptive         | VI  |
| Alimentary habits, physical activity, and framingham global risk score in metabolic syndrome[23] | 2014   | Randomized clinical trial | III |
| Prevalence of metabolic syndrome in elderly and agreement among four diagnostic criteria[26] | 2014   | Cross-sectional     | VI  |
| Metabolic syndrome in overweight/obese female adolescents[20]          | 2012   | Cross-sectional     | VI  |
| Nutrition and self-care practices of patients with chronic metabolic syndrome: a qualitative study[31] | 2012   | Descriptive         | VI  |
| Overweight and obesity in students aging 6-10 years of a state school in Umuarama-PR-Brazil[32] | 2017   | Descriptive         | VI  |
| Metabolic syndrome prevalence in patients with refractory schizophrenia[32] | 2016   | Cross-sectional     | VI  |
| Components of metabolic syndrome and associated factors in adolescents: a case-control study[32] | 2016   | Case-control study  | IV  |
| Persistence of metabolic syndrome in children and adolescents are overweight according to two diagnostic criteria: a longitudinal study[47] | 2015   | Longitudinal        | VI  |
| Prevalence of metabolic syndrome in metallurgical workers from different shifts[26] | 2015   | Cross-sectional     | VI  |
| Metabolic syndrome risk assessment in children: use of a single score[26] | 2015   | Cross-sectional     | VI  |
| Metabolic syndrome and its relationship with cardiovascular risk scores in adults with non-communicable chronic diseases[27] | 2014   | Cross-sectional     | VI  |
| Metabolic syndrome components in arterial hypertension[48]              | 2012   | Cross-sectional     | VI  |
| Metabolic syndrome and breast cancer: a systematic review[56]          | 2012   | Systematic review   | III |
| Prevalence of metabolic syndrome and its components in the menopausal transition: a systematic review[48] | 2012   | Systematic review   | III |
| Metabolic syndrome in coronary artery and occlusive vascular diseases: a systematic review[48] | 2010   | Systematic review   | III |
| Prevalence of metabolic syndrome in adolescents: a systematic review[48] | 2009   | Systematic review   | III |
| Metabolic syndrome and quality of life: a systematic review[41]        | 2016   | Systematic review   | III |
| Prevalence of metabolic syndrome among nursing personnel and its association with occupational stress, anxiety and depression[44] | 2015   | Descriptive         | VI  |
| A web-based health promotion program for patients with metabolic syndrome[45] | 2014   | Longitudinal        | VI  |
| Androgen-deprivation therapy and metabolic syndrome in men with prostate cancer[46] | 2014   | Longitudinal        | VI  |
| A randomized controlled trial undertaken to test a nurse-led weight management and exercise intervention designed for people with serious mental illness who take second generation antipsychotics[47] | 2013   | Randomized clinical trial | III |
| Bipolar disorder and metabolic syndrome: a systematic review[48]       | 2013   | Systematic review   | III |
| Implementing an evidence-based metabolic syndrome prevention and treatment program utilizing group visits[48] | 2011   | Randomized clinical trial | III |
| Syndrome in african americans: views on making lifestyle changes[50]   | 2010   | Descriptive         | VI  |
| Influence of physical activity and nutritional habits on the risk of metabolic syndrome[51] | 2016   | Cross-sectional     | VI  |
| Standardization of healthcare provided to metabolic syndrome in peritoneal dialysis[50] | 2012   | Descriptive         | VI  |
| Metabolic syndrome in peritoneal dialysis[51]                          | 2011   | Descriptive         | VI  |

Note: *EL – Evidence level; 1SciELO – Scientific Electronic Library Online; 1ICNP® – International Classification for Nursing Practice; §LILACS – Latin American and Caribbean Health Sciences Literature; ||PR – Paraná state, Brazil; *MEDLINE – Medical Literature Analysis and Retrieval System Online; **IBECS – Índice Bibliográfico Español en Ciencias de la Salud
Publications that prevailed were those indexed in the database SciELO (36.1%), published in Brazil (75%), mostly (19.4%) in the year 2014. Through the critical analysis of the definitions of the concept in the publications, we observed that the expression “aggregation” was the most frequent initial term in definitions and, in our study, we used it to initially relate the essential features to the concept, antecedents, and outcomes. However, part of the studies conducted by the nursing field still defines the syndrome as a condition of disease, disorder, or abnormality, as shown in Figure 3.

Figure 3 – Examples of expressions used by the authors to define the metabolic syndrome concept. João Pessoa, PB, Brazil, 2018

In Table 1 we present the absolute and relative frequencies of the concepts and factors related to antecedents and outcomes of the analyzed concept, in which we verified frequency of diagnostic characteristics of the syndrome as essential features in 100% of the publications, as well as in antecedents and outcomes related to inadequate nutrition and physical inactivity, and the occurrence of cardiovascular diseases and type 2 diabetes, respectively.

Through the results, we verified that the “metabolic syndrome,” as an objective phenomenon, features empirical indicators related to essential features, antecedents, and outcomes in the short, medium, and long term, to be clearly evidenced in clinical practice of nursing professionals, as we show in Figure 4.

The analysis provided structuring the broader and more comprehensive operational definition of the metabolic syndrome phenomenon, which is characterized by the aggregation of significant cardiovascular risk markers of multifactorial etiology, related to asymptomatic inflammation that predisposes the individual to vulnerability. It involves the identification of at least three diagnostic criteria, such as high waist circumference, high fasting glucose, high blood pressure, high triglycerides, and/or low high-density lipoprotein cholesterol, according to the adopted parameter and the demand for multidisciplinary approach within the nursing context.

Table 1 – Frequency of features, antecedents, and outcomes of the metabolic syndrome concept, according to number of analyzed studies. João Pessoa, PB, Brazil, 2018

| Concepts/related factors | %F | %|
|-------------------------|----|---|
| **Essential features**  |    |   |
| High blood pressure     | 36 | 100 |
| High fasting glucose    | 36 | 100 |
| High triglycerides      | 36 | 100 |
| High waist circumference| 36 | 100 |
| Low high-density lipoprotein cholesterol | 36 | 100 |
| Aggregation             | 07 | 19.4 |
| Asymptomatic inflammation| 06 | 16.7 |
| Significant cardiovascular risk markers | 03 | 8.3 |
| Multifactorial etiology | 02 | 5.6 |
| Vulnerability           | 02 | 5.6 |
| Demand demand multidisciplinary approach | 01 | 2.8 |
| **Antecedents**         |    |   |
| Sedentary lifestyle     | 36 | 100 |
| Inadequate nutrition    | 36 | 100 |
| Unfavorable socioeconomic and educational condition | 13 | 36.1 |
| Smoking and alcoholism  | 10 | 27.8 |
| Prevalence among different sex, ethnicities, ages, and races | 08 | 22.2 |
| Genetic predisposition to cardiometabolic changes | 08 | 22.2 |
| Depression and anxiety  | 08 | 22.2 |
| Inadequate working organization and conditions | 07 | 19.4 |
| Weight gain             | 07 | 19.4 |
| Stress                  | 07 | 19.4 |
| Lack of knowledge       | 06 | 16.7 |
| Deficit in self-care    | 06 | 16.7 |
| High estrogen/progesterone and menopause | 06 | 16.7 |
| Use of psychotropic medication and polypharmacy | 05 | 13.9 |
| Impaired sleep and rest | 04 | 11.1 |
| Low adhesion            | 04 | 11.1 |
| Family history of cardiovascular diseases | 03 | 8.3 |
| Feelings of frustration, sadness, failure, and guilt | 02 | 5.6 |
| Issues in working relationships | 02 | 5.6 |
| Lack of family and social support | 02 | 5.6 |
| Difficulty in interpersonal relationships | 02 | 5.6 |
| Dialysis                | 02 | 5.6 |
| Bipolar disorder and schizophrenia | 02 | 5.6 |
| Hormone replacement or deprivation therapy | 02 | 5.6 |
| **Outcomes**            |    |   |
| Occurrence of cardiovascular diseases and diabetes mellitus type 2 | 36 | 100 |
| Decreased life expectancy and premature morbidity and mortality | 18 | 50 |
| Impairment of quality of life | 09 | 25 |
| Risk of cardiovascular and cerebrovascular complications | 09 | 25 |
| Emotional impacts       | 06 | 16.7 |
| Kidney diseases         | 04 | 11.1 |
| High treatment costs and number of hospitalizations | 03 | 8.3 |
| Impacts on work performance and occupational diseases | 03 | 8.3 |
| Social isolation and risk of suicide | 03 | 8.3 |
| Neoplasms               | 02 | 5.6 |
| Low self-esteem and negative self-image | 02 | 5.6 |

Note: %F – Absolute frequency; % – Relative frequency
Discussion

Regarding definitions that we found in the studies, we observed prevalence of the use of expressions that relate the metabolic syndrome to a pathological condition, which is common, but inadequate. This fact is related to the remnants of the culture of the biological health, focused on disease, still evident in the literature. Our study contributes to clarifying and advancing the metabolic syndrome concept, defining it by a more comprehensive point of view and based on theoretical references for the use on the part of nursing professionals and scientific community and other health fields.

The “Antecedents” category was organized into three categories and eight subcategories, with syndrome-related factors evidenced in literature and analyzed concerning its insertion in the field of nursing. Regarding biological factors, categorized in our study as “non-modifiable,” we found prevalence of the phenomenon from varying diagnostic criteria, in different ethnicities, races, ages, and both sexes, in particular the high prevalence among children, adolescents, and young adults and older adults, and these groups of individuals are constantly attended by the nursing staff in programs of the Primary Health Care.
be systematically provided and registered according to a standardized language, from a classification system.

For the older population, menopause transition promotes increase in the measurement of waist circumference, blood pressure, fasting blood glucose, triglycerides, and decrease in the high-density lipoprotein cholesterol, more expressive in the first two. Hence, regarding the relation between the syndrome, menopause transition, and age, most studies showed that menopause transition was an independent predictor; however, there is need for studies with more robust designs to establish the relation of cause and effect.

Concerning behavioral factors, we identified more studies with high level of scientific evidence, especially publications in the nursing field and/or developed by nurses. Authors of national and international studies point that nurses need to consider such factors when planning and prescribing nursing interventions directed to this clinical profile and population, in such a way to achieve results relevant to the nursing practice.

According to results of another study, nurses’ recommendation on nutrition and physical activity, in all groups, may be deemed a paramount tool for the overall treatment of patients with metabolic syndrome, since there were positive results concerning metabolic and cardiovascular parameters, with encouragement for changing lifestyle to improve the quality of life of this population.

Studies on several types of nursing interventions, healthcare promotion programs, Web-based visits, and self-care to changes in lifestyle and increased adherence among patients with the syndrome highlight impacts on the reduction of metabolic parameters and improvement in the quality of life, with beneficial effects on metabolic parameters, in particular, in weight loss and waist circumference.

As for the most frequent antecedents, their set negatively acts on the lipid profile and increases the prevalence of the syndrome and, therefore, the risk of cardiovascular disease. Moreover, attention is draw to the effective development of healthcare actions, based on knowledge and adherence to preventive behaviors for decreasing diseases resulting from the syndrome. Nurses are members of the participatory process of identifying these human responses and providing guidance for improving life habits and adherence to measures of healthcare promotion.

Concerning psychosocial and cultural factors, the literature highlights the correlation between metabolic syndrome variables and anxiety, and between the syndrome and stress. Nursing staff must seek social and family support, in such a way it may help in identifying ways to communicate with professionals.

In this situation, it is important to develop environments for nursing interaction, with families and community, for a healthy nutrition routine, practice of physical exercise, and weight and stress control.

As for working factors, the syndrome can be related to some variables, such as work, poor sleep quality, poor diet, sedentary lifestyle, alcoholism, smoking, absenteeism, and dissatisfaction with the work. Concerning such factors, studies have been developed with nurses for understanding this phenomenon among these professionals, who will be attended by other nursing professionals, and that the phenomenon also occurs in this category, which needs to be recognized and monitored.

Infectious factors identified as antecedents to the syndrome, such as depression, schizophrenia, and bipolar disorder, were found due to the number of hospitalizations and used drugs, adverse effects, and inadequate nutrition, correlated with therapeutic factors, in which nursing professionals participate in the process of monitoring and managing the care provided to these individuals.

In the category of Essential Features, clinical and biochemical indicators have been recurrent and are essential for the clinical management of the syndrome, but other relevant features were more clearly perceived to define and broadly understand this concept. Thus, more important than add or modify indicators, we must be able to identify them in the clinical practice, to invest in health education and prevention measures, and to encourage good life habits, with the exchange of experiences and adoption of good health practices. These actions can be effectively carried out by nurses when they understand the magnitude of the phenomenon under their care and seek to improve knowledge, whether by searching evidence-based interventions or by researching to identify the best practice in scientific basis within several disciplines.

Hence, a multidisciplinary approach in health is necessary in order to reduce factors responsible for the emergence of the syndrome and its respective outcomes. Nurses routinely deal with the imbalance of these factors and have an important role on the diagnosis, healthcare planning, strategy interventions, and control of this syndrome.

Nursing professionals use knowledge from other fields in their professional practice and efficiently implement them, since they monitor, in a more longitudinal way, people affected by this syndrome. These professionals, within a multidisciplinary work, must know the concept of the phenomenon and engage in developing actions that promote cardiovascular health in people affected with the syndrome and which reduce the consequent morbidity and mortality.
The categorized features enabled the creation of an operational definition for the metabolic syndrome concept as a nursing phenomenon, in order to be used in the planning and implementation of nursing care and in the field of teaching and research, in such a way to reduce the antecedents and the respective outcomes of short, medium, and long term – and in these last we evidenced high frequency of the outcome related to the occurrence of cardiovascular disease and diabetes mellitus type 2(14,19-53).

We understand that such outcome comprises a relevant susceptibility to prevention, when performed effectively and comprehensively, being inserted into nursing in primary-level services, through evidence-based care, aiming at reducing the burden of the disease.

Hence, empirical data we presented in this study involve the nursing context, whereas the metabolic syndrome phenomenon comprises a set of features with antecedents and outcomes which are sensitive and verifiable in the working process within the area, actively inserted in the development of technologies for the prevention of metabolic syndrome(20), establishing diagnoses, outcomes, and nursing interventions to the theoretical-practical improvement in nursing.

Among the limitations, we found not using all the steps proposed by the theoretical reference as well as not carrying out the analysis by experts. Such did not impair the scope of the objective, since we sought to critically analyze the evidenced empirical data, in addition to the methodological strictness. Further research should enhance the development of the concept, filling in the existing gaps, through studies with experimental designs to advance in the knowledge about the phenomenon and the application of the concept in the professional practice.

As a contribution, we mention, in particular, the introduction of scientific evidences to the understanding and discussion on metabolic syndrome as a nursing phenomenon, to the extent it collaborates to advances in the theoretical knowledge within the field of health, due to the prominence of new and relevant empirical data, such as the involved psychosocial and cultural factors and the prospect of vulnerability in which people with the syndrome are inserted as well as the broadening of a concept relevant to health policies and healthcare programs directed at healthcare promotion and cardiovascular prevention, with the active participation of nursing.

Conclusion

The results of the analysis of the metabolic syndrome concept allowed the identification and articulation of the essential features of the phenomenon in the context of nursing, in addition to its most frequent antecedents and outcomes such as diagnostic criteria, life habits, and clinical impairment due to cardiometabolic diseases, corroborating the overall literature on the subject.

Our analysis of empirical data provided structuring the broader and more comprehensive operational definition of the metabolic syndrome concept, which is characterized by the aggregation of significant cardiovascular risk markers of multifactorial etiology, related to asymptomatic inflammation that predisposes the individual to vulnerability. It involves the identification of at least three diagnostic criteria, such as high waist circumference, high fasting glucose, high blood pressure, high triglycerides, and/or low high-density lipoprotein cholesterol, according to the adopted parameter and the demand for multidisciplinary approach within the nursing context.

Understanding the scope of the concept under analysis is required to its use in the practice, teaching, and research in nursing and health, and it enables the recognition of variables involved in this phenomenon to guide nurses and nursing staff in the process for identifying human responses of individuals affected with the syndrome and for planning the nursing cardiovascular care.

These professionals should engage in the improvement of the concept and in the verification of the emergence of this syndrome, in such a way to contribute to the development of cardiovascular prevention within these patients and broaden research in the metabolic syndrome as a nursing phenomenon, through existing and developing theoretical references.

References

1. Simão AF, Precoma DB, Andrade JP, Correa H Filho, Saraiva JFK, Oliveira GMM, et al. I Diretriz Brasileira de Prevenção Cardiovascular. Arq Bras Cardiol. 2013 Dez; 101(6 Suppl2):1-63. doi: 10.5935/abc.2013S012
2. Alberti G, Zimmet P, Shaw J, Grundy SM. The IDF consensus worldwide definition of the metabolic syndrome [Internet]. Brussels: International Diabetes Federation; 2006 [cited Jun 12, 2018];1:25. Available from: www.idf.org/webdata/docs/IDF_Meta_def_final.pdf
3. Ramires EKNM, Menezes RCE, Silva GL, Santos TG, Marinho PM, Silveira JAC. Prevalence and Factors Associated with Metabolic Syndrome among Brazilian Adult Population: National Health Survey – 2013. Arq Bras Cardiol. 2018;110(5):455-66. doi: 10.5935/abc.20180072
4. Reaven GM. The metabolic syndrome: time to get off the merry-go-round? J Intern Med. 2011 Nov 15;269(2):127-36. doi: 10.1111/j.1365-2796.2010.02325.x
5. Correia LCL, Latado AL, Barreto-Filho JA. Metabolic or pseudometabolic syndrome? Arq Bras Cardiol. 2012 Abr;98(4):e74-e75. doi: 10.1590/S0066-782X2012000400016

6. Silva CC, Zambon MP, Vasques AC J, Rodrigues AMB, Camilo DF, Antonio MARG, et al. Neck circumference as a new anthropometric indicator for prediction of insulin resistance and components of metabolic syndrome in adolescents: Brazilian Metabolic Syndrome Study. Rev Paul Pediatr. 2014 Jun;32(2):221–9. doi: 10.1590/0103-0582201432210713

7. Ávila MAP, Borges LP, Paez MS, Bruno RV, Nardi AE, Pessôa ACM, et al. Acanthosis nigricans: metabolic interrelations inherent to the polycystic ovary syndrome. Rev Bras Ginecol Obstet. 2014 Set;36(9):410–5. doi: 10.1590/0034-8910.20140005000026

8. Reaven GM. Banting Lecture 1988. Role of insulin resistance in human diseases. Diabetes. 1988 Dec;37:1595-1607. doi: 10.2337/diabetes.37.12.1595

9. Lerario AC, Betti RTB, Wajchenberg BL. O perfil lipídico e a síndrome metabólica. Rev Assoc Med Bras. 2009;55(3):229-50. doi: 10.2337/diabetes.37.12.1595

10. Correia LCL, Latado AL, Barreto-Filho JA. Metabolic or pseudometabolic syndrome? Arq Bras Cardiol. 2012 Abr;98(4):e74-e75. doi: 10.1590/S0066-782X2012000400016

11. Schlaich M, Straznicky N, Lambert E, Lambert G. Metabolic syndrome: a sympathetic disease? Lancet Diabetes Endocrinol. 2014 Feb;3(2):148-57. doi: 10.1016/S2213-8587(14)70033-6

12. Alberti KG, Eckel RH, Grundy SM, Zimmet PZ, Cleeman JI, Donato KA, et al. Harmonizing the metabolic syndrome: a joint interim statement of the International Diabetes Federation Task Force on Epidemiology and Prevention; National Heart, Lung, and Blood Institute; American Heart Association; World Heart Federation; International Atherosclerosis Society; and International Association for the Study of Obesity. Circulation. 2009 Oct 20;120(16):1640-5. doi: 10.1161/CIRCULATIONAHA.109.192644

13. Huang PL. A comprehensive definition for metabolic syndrome. Dis Model Mech. 2009 Mai/Jun;2(5-6):231-7. doi: 10.1242/dmm.001180

14. Félix NDC, Ramos NM, Nascimento MNR, Moreira TMM, Oliveira CJ. Nursing diagnoses from ICNP® for people with metabolic syndrome. Rev Bras Enferm. 2018;71(Suppl 1):467-74. [Thematic Issue: Contributions and challenges of nursing practices in collective health] doi: 10.1590/0034-7167-2017-0125

15. Walker LO, Avant KC. Strategies for theory construction in nursing. 5th ed. Upper Saddle River: Pearson Prentice Hall; 2011.

16. Soares CB, Hoga LAK, Peduzzi M, Sangaleti C, Yonekura T, Silva DRAD. Integrative review: concepts and methods used in nursing. Rev Esc Enferm USP. 2014 Abr;48(2):335-45. doi: 10.1590/S0080-623420140000200020

17. Moher D, Liberati A, Tetzlaff J, Altman DG. The PRISMA Group. Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement. PLoS Med. 2009 Jul 21;6(7):e100097. doi: 10.1371/journal.pmed100097

18. Stillwell SB, Fineout-Overholt E, Melnyk BM, Williamson KM. Searching for the evidence: strategies to help you conduct a successful search. Am J Nurs. [Internet]. 2010 Mai [cited FeB 12, 2018];110(1):41-7. Available from: http://www.nursingcenter.com/nursingcenter_redesign/media/EBP/AJNseries/Searching.pdf

19. Nobre RS, Guimarães MR, Batista AMO, Sousa AF, Lima LHO, Silva ARV. Anthropometric indicators that predict metabolic syndrome among adolescents. Texto Contexto Enferm. 2018 Mar 21;27(1):e5270016. doi: 10.1590/0104-070720180005270016

20. Moura IH, Silva AFR, Rocha AESH, Lima LHO, Moreira TMM, Silva ARV. Construction and validation of educational materials for the prevention of metabolic syndrome in adolescents. Rev Latino-Am. Enfermagem. 2017 Oct 5,25:e2934. doi: 10.1590/1518-8345.2024.2934

21. Lira Neto JCG, Xavier MA, Borges JWP, Araújo MFM, Damasceno MMC, Freitas RWJF. Prevalence of Metabolic Syndrome in Individuals with Type 2 Diabetes Mellitus. Rev Bras Enferm. 2017 Mar/Apr;70(2):265-70. doi: 10.1590/0034-7167-2016-0145

22. Saboya PP, Bodanese LC, Zimmermann PR, Gustavo AS, Assumpção CM, Londofo F. Metabolic syndrome and quality of life: a systematic review. Rev Latino-Am. Enfermagem. 2016 Nov 28;24:e2848. doi: 10.1590/1518-8345.1573.2848

23. Carvalho RB, Nobre RS, Guimarães MR, Teixeira SE, Silva AR. Risk factors associated with the development of metabolic syndrome in children and adolescents. Acta Paul Enferm. 2016 Jul/Aug;29(4):439-45. doi: 10.1590/1982-0194201600060

24. Canuto R, Pattussi MP, Macagnan JBA, Henr RL, Olinto MTA. Metabolic syndrome in fixed-shift workers. Rev Saúde Pública. 2015 Jun 9;49:30. doi: 10.1590/0104-45.20140000200020

25. Pereira DCR, Araújo MFM, Freitas RWJF, Teixeira CRS, Zanetti ML, Damasceno MMC. Neck circumference as a potential marker of metabolic syndrome among college students. Rev. Latino-Am. Enfermagem. 2014 Nov/Dez;22(6):973-9. doi: 10.1590/0104-1169.3565.2505

26. Silva ARV, Sousa LSN, Rocha TS, Cortez RMA, Macêdo LGN, Almeida PC. Prevalence of metabolic components in university students. Rev. Latino-Am. Enfermagem.
2014 Nov/Dez;22(6):1041-47. doi: 10.1590/0104-1169.0129.2514
27. Soares TS, Piovesan CH, Gustavo AS, Macagnan FE, Bodanese LC, Feoli AMP. Alimentary habits, physical activity, and framingham global risk score in metabolic syndrome. Arq Bras Cardiol. 2014 Feb 17;102(4):374-82. doi: 10.5935/abc.20140029
28. Saad MAN, Cardoso GP, Martins WA, Velarde LG, Cruz RA Filho. Prevalence of metabolic syndrome in elderly and agreement among four diagnostic criteria. Arq Bras Cardiol. 2014 Mar;102(3):263-9. doi: 10.5935/abc.20140013
29. Pinho AP, Brunetti IL, Pepato MT, Almeida CA. Metabolic syndrome in overweight/obese female adolescents. Rev Paul Pediatr. 2012;30(1):51-6. doi: 10.1590/S0103-058220100000008
30. Vieira CM, Chvatal VLS, Cordeiro SN, Turato ER. Nutrition and self-care practices of patients with chronic metabolic syndrome: a qualitative study. Acta Paul Enferm. 2012 Jul 31;25(4):537-42. doi: 10.1590/S0103-21002012005000017
31. Carvalho ARM, Belém MO, Oda JY. Sobrepeso e obesidade em alunos de 6-10 anos de escola Estadual de Umuarama/PR. Arq Cienc Saúde UNIPAR. 2017 Jan/Abr;21(1):3-12. doi: 10.25110/arqsaude.v21i1.2017.6070
32. Freitas PHB, Granjeiro PF, Vecchia BP, Paula ML, Tavares MC; Machado RM. Metabolic syndrome prevalence in patients with refractory schizophrenia. Cienc Enferm. 2016 Set;22(3):11-24. doi: 10.4067/S0103-9553201600000011
33. Pontes LM, Amorim RJM, Lira PIC. Components of metabolic syndrome and associated factors in adolescents: a case-control study. Rev AMRIGS. [Internet]. 2016 Abr/Jun [cited Abr 17, 2018];60(2):121-28. Available from: http://www.amrigs.org.br/revista/60-02/10_1598_Revista%20AMRIGS.PDF
34. Cantalice ASC, Santos NCCB, Oliveira RC, Collet N, Medeiros CCM. Persistence of metabolic syndrome in children and adolescents are overweight according to two diagnostic criteria: a longitudinal study. Medicina. (Ribeirão Preto). 2015;48(4):342-8. doi: 10.11606/issn.2176-7262.v48i4p342-348
35. Moreno E, Martino MM, Costa RF. Prevalence of metabolic syndrome in metallurgical workers from different shifts. Acta Paul Enferm. 2015 Jul/Aug;28(4):388-94. doi: 10.1590/1982-0194201500065
36. Villa JKD, Silva AR, Santos TSS, Ribeiro AQ, Sant’Ana LFR. Metabolic syndrome risk assessment in children: use of a single score. Rev Paul Pediatr. 2015 Jun;33(2):187-93. doi: 10.1016/j.rpped.2014.11.001
37. Pinho PM, Machado LMM, Torres RS, Carmin SEM, Mendes WAA, Silva AC, et al. Metabolic syndrome and its relationship with cardiovascular risk scores in adults with non-communicable chronic diseases. Rev Soc Bras Clin Med. 2014 Jan/Mar;12(1):22-30. doi: 10.1590/0104-1169.0383.2573
38. Marchi-Alves LM, Rigotti AR, Nogueira MS, Cesarino CB, Godoy S. Metabolic syndrome components in arterial hypertension. Rev EscEnfermUSP.2012 Dez;46(6):1348-53. doi: 10.1590/S0080-62342012000000010
39. Feitosa FS, Serrano Junior CV, Takemura RL, Moreira HG, Del Giglio A. Metabolic syndrome and breast cancer: systematic review. Rev Bras Clin Med. [Internet]. 2012 Nov/Dez [cited Apr 26, 2018];10(6):513-20. Available from: http://files.bvs.br/upload/S/1679-1010/2012/v10n6/a3187.pdf
40. Mendes KG, Theodoro H, Rodrigues AD, Olinto MTA. Prevalence of metabolic syndrome and its components in the menopausal transition: a systematic review. Cad Saúde Pública. 2012 Ago;28(8):1423-37. doi: 10.1590/S0102-311X2012000800002
41. Farias DRE, Pereira AF, Rosa G. Metabolic Syndrome in Coronary Artery and Occlusive Vascular Diseases: A Systematic Review. Arq Bras Cardiol. 2010 Jun;94(6):e150-78. doi: 10.1590/S0106-782X2010000000024
42. Moraes ACF, Fuzal CS, Netto-Oliveira ER, Reichert FF. Prevalence of metabolic syndrome in adolescents: a systematic review. Cad Saúde Pública. 2009 Jun;25(6):1195-202. doi: 10.1590/S0102-311X2009000600002
43. Saboya PP, Bodanese LC, Zimmermann PR, Gustavo AS, Macagnan FE, Feoli AP, et al. Lifestyle Intervention on Metabolic Syndrome and its Impact on Quality of Life: A Randomized Controlled Trial. Arq Bras Cardiol. 2017 Jan;108(1):60-9. doi: 10.5935/abc.20160186
44. Ribeiro RP, Marziale MHP, Martins JT, Ribeiro PHV, Robazzi MLCC, Dalmas JC. Prevalence of Metabolic Syndrome among nursing personnel and its association with occupational stress, anxiety and depression. Rev. Latino-Am. Enfermagem. 2015 Jul 03;23(3):435-40. doi: 10.1590/0104-1169.0383.2573
45. Kang JS, Kang HS, Jeong Y. A Web-based Health Promotion Program for Patients with Metabolic Syndrome. Asian Nurs Res (Korean Soc Nurs Sci). 2014 Mar;8(1):82-9. doi: 10.1016/j.anr.2014.03.002
46. Harrington JM, Schwenke DC, Epstein DR, Bailey DEJ. Androgen-deprivation therapy and metabolic syndrome in men with prostate cancer. Oncol Nurs Forum. 2014 Jan 01;41(1):21-9. doi: 10.1188/14.ONF.21-29
47. Usher K, Park T, Foster k, Buettner P. A randomized controlled trial undertaken to test a nurse-led weight management and exercise intervention designed for people with serious mental illness who take second generation antipsychotics. J Adv Nurs. 2013 Jul;69(7):1539–48. doi: 10.1111/jan.12012
48. Czepielewski L, Daru Filho L, Brietzke E, Grassi-Oliveira R. Bipolar disorder and metabolic syndrome: a systematic review. Rev Bras Psiquiatr. 2013 Mar;35(1):88-93. doi: 10.1016/j.rbp.2012.00.000

49. Greer DM, Hill DC. Implementing an evidence-based metabolic syndrome prevention and treatment program utilizing group visits. J Am Acad Nurse Pract. 2011 Feb;23(2):76-83. doi: 10.1111/j.1745-7599.2010.00585.x

50. Kirkendoll KD, Clark PC, Grossniklaus D, Igbo-Pemu P, Mullis R, Dunbar SB. Metabolic Syndrome in African Americans: Views on Making Lifestyle Changes. J Transcult Nurs. 2010 Apr;21(2):104–13. doi: 10.1177/1043659609357636

51. Morales MIA, Delgado VP, Bonilla JAM. Influence of physical activity and nutritional habits on the risk of metabolic syndrome. Enfermería Global. 2016 Out;44:222-34. doi:10.6018/eglobal.15.4.236351

52. Segura FC, Montes MR, Sánchez VR, Espejo JLM. Estandarización de cuidados del síndrome metabólico en diálisis peritoneal. Enferm Nefrol. 2012 Abr/Jun;5(2):129-37. doi:10.4321/S2254-28842012000200008

53. Segura FC, Espejo JLM. Síndrome metabólico en diálisis peritoneal. Metabolic syndrome in peritoneal dialysis. Rev Soc Esp Enferm Nefrol. [Internet]. 2011 Out/Dez [cited Mai 10, 2018];14(4):250-7. Available from: http://pesquisa.bvsalud.org/portal/resource/pt/ibc-93844

54. Ministério da Saúde (BR). Secretaria de Vigilância em Saúde. Departamento de Vigilância de Doenças e Agravos não Transmissíveis e Promoção da Saúde. Vigílens Brasil 2017: vigilância de fatores de risco e proteção para doenças crônicas por inquérito telefônico: estimativas sobre frequência e distribuição sociodemográfica de fatores de risco e proteção para doenças crônicas nas capitais dos 26 estados brasileiros e no Distrito Federal em 2017. [Internet]. Brasília: Ministério da Saúde; 2018 [Acesso 18 dez 2018]. Disponível em: http://bvsms.saude.gov.br/bvs/publicacoes/vigilencia_brasil_2017_vigilancia_fatores_risco.pdf

Received: Aug 11th 2018
Accepted: Feb 17th 2019

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