Hypertension in people deprived of liberty in Brazil and around the world: a systematic review

Hipertensão Arterial Sistêmica em pessoas privadas de liberdade no Brasil e no mundo: revisão sistemática

ABSTRACT

Objective: to analyze the state of the art of care interventions used to control hypertension in people deprived of liberty of both sexes in Brazil and around the world. Method: this is a systematic review, which included studies from 2017 to 2022 in Portuguese, English and Spanish in the Virtual Health Library, National Library of Medicine, Cumulative Index to Nursing and Allied Health Literature and Embase databases. The data were coded with the help of NVivo software, using thematic analysis. Results: the search resulted in 10,043 articles, of which 12 were part of the final sample, in which quantitative and cross-sectional studies predominated. Five categories of analysis emerged after coding: Hypertension prevalence; Sociodemographic characteristics of people deprived of liberty; Risk factors for hypertension; Hypertension treatment; and Suggestions for actions/interventions in hypertension. Conclusion: no specific care interventions were found for people deprived of liberty to control hypertension; the studies were scarce and related to prevalence and risk factors.

Descriptors: Hypertension; Prisoners; Primary Prevention; Prisons; Adult Health.

RESUMO

Objetivo: analisar o estado da arte das intervenções de cuidado utilizadas para o controle da Hipertensão Arterial Sistêmica em pessoas privadas de liberdade de ambos os sexos no Brasil e no mundo. Método: trata-se de revisão sistemática, que incluiu estudos de 2017 a 2022, nos idiomas português, inglês e espanhol, nas bases Biblioteca Virtual de Saúde, National Library of Medicine, Cumulative Index to Nursing and Allied Health Literature e Embase. Os dados foram codificados com auxílio do software NVivo, utilizando-se a análise temática. Resultados: a busca resultou em 10.043 artigos, dos quais 12 integraram a amostra final, na qual predominaram os estudos quantitativos e transversais. Emergiram cinco categorias de análise após a codificação: Prevalência da Hipertensão Arterial Sistêmica; Características sociodemográficas das pessoas privadas de liberdade; Fatores de risco para Hipertensão Arterial Sistêmica; Tratamento da Hipertensão Arterial Sistêmica; e Sugestões de ações/intervenções na Hipertensão Arterial Sistêmica. Conclusão: não foram encontradas intervenções de cuidados específicas para pessoas privadas de liberdade no controle da Hipertensão Arterial Sistêmica; os estudos foram parcos e relacionados à prevalência e aos fatores de risco.

Descritores: Hipertensão; Prisioneiros; Prevenção Primária; Prisões; Saúde do Adulto.
INTRODUCTION

Cardiovascular diseases (CVD) are the main cause of death in the world. Among CVD, hypertension (HP) significantly increases the risk of heart, brain and kidney diseases, among others, and is one of the main causes of premature death. HP affects around 1.28 billion adults aged 30 to 70 worldwide; of these, two-thirds live in low- and middle-income countries. It is estimated that around 46% of people living with HP do not even know they have the disease; only 42% are diagnosed and treated appropriately; and only 21% manage to control the disease.¹

As in the community, CVD are one of the main causes of death among people deprived of liberty (PDL), with people recently released from prison having a higher risk of hospitalization and death than those presented by the general population, even considering racial and socioeconomic differences. PDL, when paired with individuals in the community, present greater risks and risk factors for CVD as well as HP and smoking.²

A study carried out in Italian prisons found rates of 11.4% for CVD; however, despite being younger in prison than in the general population, they demonstrated an unusual prevalence for such a young population (average age of 39.6 years, reaching 12% in those aged between 18 and 65 years), differing from the prevalence in the general population, greater in older adults³. In Brazil, studies in prisons in Rio de Janeiro found a prevalence of 23.9% for diseases of the circulatory/cardiac system in self-reports of PDL.⁴

Among people with HP, the comparison of people with a recent history of deprivation of liberty versus the general population demonstrated that former PDL were more prone to uncontrolled blood pressure (BP) than those not deprived of liberty⁵. Hence, it is highlighted that the healthcare provided to PDL must be equivalent to that provided to the general population; however, it is necessary to consider that the living standards of population groups interfere in the pattern of health and illness, therefore requiring care focused on their specific needs.⁶,⁷,⁸

The investigations into the health conditions of prisoners are scarce, there is a lack of detailed information about the health of PDL, which makes it difficult to prevent and treat diseases with a higher incidence in this population, especially those related to chronic illness, such as HP.⁹,¹⁰

OBJECTIVE

To analyze the state of the art of care interventions used to control HP in PDL of both sexes in Brazil and around the world.
METHOD

This is a systematic review, which allows the existing knowledge on an issue to be synthesized and summarized in a comprehensive and impartial way in a single document. Rigorous and transparent methods were used, which gives reliability and meaning to the results; thus, it is useful in guiding practice and policy.11

For its operationalization, the following steps were followed: formulation of the scientific review question; definition of inclusion and exclusion criteria; identification of databases to be consulted and search strategies for locating studies; selection of studies for inclusion; assessment of the quality of studies; data extraction; analysis and synthesis of relevant studies; and presentation and interpretation of results.11

The first stage consisted of constructing the guiding question: what are the actions used to control HP in PDL of both sexes in Brazil and around the world? To this end, the acronym PICOT was used (P - population: PDL with HP of both sexes; I - intervention: treatment and care actions for HP; C - context: prison; O – outcomes: drug and non-drug treatment and/or control actions to maintain normal BP levels, in accordance with global guidelines; T –study design: cohort, cross-sectional, case control, quasi-experimental (observational studies).

Once the guiding question was defined, the second stage was carried out, searching for primary articles in Portuguese, English and Spanish, from 2017 to 2021, in the Virtual Health Library (VHL), National Library of Medicine (PubMed), Cumulative Index to Nursing and Allied Health Literature (CINAHL) and Embase databases. Search strategies are described in Chart 1.

**Chart 1. Search strategies. Foz do Iguaçu, Paraná, Brazil, 2022**

<table>
<thead>
<tr>
<th>Databases</th>
<th>Search strategy</th>
<th>Results</th>
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<tbody>
<tr>
<td>VHL</td>
<td>(((hipertensão/prevenção &amp;controle) ) OR ((hipertensão arterial/prevenção &amp;controle) ) OR ((hipertensão arterial sistêmica/prevenção &amp;controle)) OR ( (pressão arterial alta/prevenção &amp;controle) ) OR (pressão arterial alta/prevenção &amp;controle)) OR (hypertension/prevention &amp; control) ) OR ((hipertensión/prevención &amp; control) ) AND ((prisioneiros) ) OR ((prisoners) ) OR ((prisioneros) ) OR ((detento) ) OR ((detentos) ) OR ((encarcerado) ) OR ((encarcerados) ) OR ((pessoa encarcerada) ) OR ((pessoa privada de liberdade) ) OR ((pessoas encarceradas) ) OR ((pessoas privadas de liberdade) ) OR ((população privada de liberdade)) OR ( (preso)) OR ( (presos)) AND (fulltext: (&quot;1&quot;) AND la: (&quot;en&quot; OR &quot;es&quot; OR &quot;pt&quot;) AND (year_cluster:[2017 TO 2022]))</td>
<td>3,926</td>
</tr>
</tbody>
</table>
The inclusion criteria were: complete articles published from 2017 to 2022; in English, Portuguese and Spanish; studies of: cohort, cross-sectional, case control, quasi-experimental, case studies (observational studies); that addressed therapeutic actions and/or interventions in HP with hypertensive PDL over 18 years of age. The exclusion criteria were: review/theoretical articles; letters to the reader; editorials; comments; abstracts of works presented at events and expert opinions; articles published prior to the last five years. It is noted that the time frame aims to work with updated scientific evidence.

After systematically planning the study, it was registered in the International Prospective Register of Systematic Reviews (PROSPERO), which was approved on July 23, 2022 under ID: CRD42022346185. The primary screening of articles took place from July 2022 to January 2023, carried out by two pairs of researchers independently using the Intelligent Systematic Review (RAYYAN) software, with the inclusion of a fifth researcher for a consensus meeting when there was disagreement.

To include and/or exclude studies, the researchers used the questions: does the title/abstract match the study inclusion criteria? Is the study duplicated? Does the study have a summary? Does the population meet the study inclusion criteria? Does the outcome of interest match (as defined with the study) the study inclusion criteria? Does the study types match the inclusion criteria? Does the study have multiple publications including the same data? Does the article have a full text available? The process took place through reading and analysis of titles and abstracts, resulting in 20 articles; subsequently, they underwent complete reading of the texts, by the same evaluators, regarding eligibility, of which 12 made up the final sample, explained in Figure 1.

**Figure 1.** Flowchart of article identification, selection and inclusion
In this process, drug and non-drug treatment actions and/or control actions to maintain normal BP levels were considered, and exposure, defined as any barrier or facilitator that prevents or facilitates HP treatment and control in prisoners. These factors were mainly related to hypertensive PDL, their care providers and healthcare systems, and included patients/professionals’ knowledge, perceptions, beliefs, practices and self-efficacy, levels of motivations, family support and other sociocultural or health-related factors, such as availability of resources, accessibility and acceptability of HP treatment.

Subsequently, independently, the same researchers extracted data related to the research question from the studies selected for inclusion, covering study design, study participants, study results, year of publication, prevalence of influencing factors in HP treatment and control (such as barriers and/or facilitators), their measure of association, types of strategies and their effects on HP treatment and control.

For the full analysis of selected studies, the Newcastle-Ottawa Quality Assessment Scale (NOS) was used to assess the quality of the observational studies included (non-randomized and randomized controlled trials). The quality of evidence from the cross-sectional studies included was assessed using the same scale adapted for this type of research. However, studies were not excluded based on the results of quality assessments.

Quantitative analysis aggregates participant data, approaching it descriptively. The individual data from each study were added to a table of the main characteristics of the
studies (author, year, language, objective, population, location, main results, study design, level of evidence). The extracted qualitative data were coded with the support of NVivo® software version for Windows to organize and store the data and for the purposes of identifying the codes, which constitute the research analysis categories, used for a descriptive analysis.

RESULTS

The search resulted in 10,043 articles; of these, 251 were duplicates between the databases and 9,772 were excluded by reading the abstract and title, as they did not meet the inclusion criteria. A total of 20 articles were selected for full reading, of which 11 were part of the final sample, the findings of which are synthesized in Chart 2. In relation to the year of publication of the articles included in the sample, publications from 2018 predominate, with 45.5% (n= 5), followed by those from 2019 and 2020, with 18.2% (n= 2) each, and 2021 and 2022, with 9.1% (n= 1). As for study design, cross-sectional studies predominated, with 81.8% (n= 8) of the sample.

Regarding language, English predominates, with 90.9% (n= 10), followed by studies in Spanish, with 9.1% (n= 1). As for the continent, America predominated, with 63.6.3% (n= 7), and, of these, 81.7% from North America (n= 6) and 14.3% (n= 1) from South America, followed by Europe, with 36.7% (n= 4). The United States of America was the country with the highest quantity of research, with 45.6% (n= 5). The main findings are also listed in Chart 2.

In analysis of scientific evidence, they were classified according to Melnyk and Fineout-Overholt as level 6 (72.7%; n= 8), level 7 (18.2%; n= 2) and level 4 (9.1%; n=1). The quality of evidence of cross-sectional studies was also assessed using the NOS adapted for cross-sectional studies: 37.5% (n= 3) scored 9 and 10 each; and 12.5% (n= 1) scored 7 and 8 each. A study that did not define the type of study, which apparently is cross-sectional, was assessed using the same scale with a score of 8. And the cohort study scored 9 in the NOS for cohort studies. The scores for each outcome are presented in Table 1.
<table>
<thead>
<tr>
<th>Author/Year/Language</th>
<th>Objective</th>
<th>Population/Place</th>
<th>Main results</th>
<th>Study design/Level of evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1 Fobian AF Froelich M Sellers A Cropsey K Redmond N</td>
<td>Identify the prevalence of the main risk factors for CVD and assess whether the risk varies by race/ethnicity.</td>
<td>100 men with a history of jail or prison incarceration ≥ six months during their most recent incarceration and enrolled in a community corrections program, Alabama, United States of America</td>
<td>They used the American Heart Association’s Life’s Simple 7™ (LS-7) and concluded that, similar to what is found in the community, non-white people who are incarcerated or have a history of incarceration are at increased risk for cardiovascular events and have less engagement in lifestyle changes for cessation of HP and worse diets and BP. Most participants had ideal cholesterol, glucose and exercise levels, and 78% were smokers. As for BP, most participants had low levels (≥ 140/90 mmHg) or intermediate levels (129-139/80-89 mmHg), according to the LS-7 classification. The data suggest that smoking, Body Mass Index, diet and BP may be significant factors in achieving prevention in this population.</td>
<td>Cross-sectional Level 6</td>
</tr>
<tr>
<td>A2 Gray BJ Craddock C Couzens Z Bain E Dunseath GJ Shankar AG Luzio SD Perrett SE</td>
<td>Examine the prevalence of undiagnosed cardiometabolic risk and associated risk factors, as well as investigate whether prolonged exposure to the prison environment affects these risk factors.</td>
<td>299 male PDL, United Kingdom</td>
<td>The majority of men were overweight (43.5%) or obese (37.5%) and/or evidence of central obesity (40.1%). Cardiometabolic risk factors, including systolic HP (25.1%), high cholesterol (29.8%), low HDL cholesterol (56.2%), and high total cholesterol:HDL ratio (23.1%) were observed in one considerable number of men; 15.4% were estimated to have an increased risk of CVD; and 31.8% were calculated at moderate or high risk of Diabetes Mellitus 2.</td>
<td>Cross-sectional Level 6</td>
</tr>
<tr>
<td>A3 Silverman-Retana O Servan-Mori E Bertozzi SM Orozco-Núñez E Bautista-Arredondo S López-Ridaura R</td>
<td>Estimate the prevalence of modifiable risk factors for chronic diseases and assess their relationship with length of incarceration.</td>
<td>3,774 PDL from four prisons, Mexico City, Mexico</td>
<td>The results suggest that, as the length of incarceration increases, physical activity increases as well as the use of alcohol and cocaine, while the quality of the diet decreases.</td>
<td>Cross-sectional, descriptive, analytical Level 6</td>
</tr>
<tr>
<td>A4</td>
<td>Trotter RT Lininger MR Camplain R Fofanov VY Camplain C Baldwin JA¹⁹ 2018 English</td>
<td>Describe incarcerated individuals’ characteristics, demographic information, income status, pre-incarceration living conditions, and identify infectious disease, chronic disease, behavioral health, substance use, and global health conditions.</td>
<td>199 PDL. Arizona, United States of America</td>
<td>There were interactive comorbidities and significant disparities in relation to the general population, in addition to a high prevalence of overweight and obesity (61.3%). HP had a prevalence of 35.9%, high cholesterol, 17.8%, arthritis, 17.5%, asthma, 14.9%, Diabetes Mellitus and pre-Diabetes Mellitus, 12.3%, liver disease, 11.9% and bronchitis, 7.2%.</td>
</tr>
</tbody>
</table>

| A5 | Vera-Remartínez EJ Monge RL Chinesta, SG Sánchez-Alcón RDS Ramos MVP₂⁰ 2018 Spanish | Describe the cardiovascular risk factors detected in a population of young adults hospitalized in a penitentiary center. | Population of 211 PDL of both sexes aged between 18 and 35 years old until September 15, 2017 of the Castellón I Penitentiary Center. Spain | The risk factors identified were the high consumption of toxic substances, the influence of a sedentary lifestyle and psychological and dietary factors. | Observational, descriptive, analytical, cross-sectional Level 6 |

<p>| A6 | Rosen DL Thomas S Kavee AL Ashkin EA²¹ 2019 English | Analyze the prevalence of chronic diseases in people who re-enter the community. | Records of medication dispensing of ex-PDL (already released from the prison system) from July 2015 to June 2016. North Carolina, United States of America | Among the 20,585 released, the prevalence of chronic health conditions was as follows: psychiatric, 15%; cardiovascular, 15%; neurological, 7%; pulmonary, 6%; Diabetes Mellitus, 3%; and infectious, 3%. HP had a prevalence of 13.4%. | Not delimited. Level 7 |</p>
<table>
<thead>
<tr>
<th>ID</th>
<th>Authors</th>
<th>Country</th>
<th>Sample Characteristics</th>
<th>Methods/Findings</th>
<th>Study Design/Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>A7</td>
<td>Wright NMJ, Hearty P, Allgar V</td>
<td>England</td>
<td>Explore the prevalence of chronic non-communicable diseases (NCD) and their risk factors. 199 male PDL from two northern prisons.</td>
<td>Physical illnesses, with the exception of respiratory illnesses, are less common. However, mental health problems are more frequent. These differences are possibly due to the younger average age of the prison population, as the prevalence of risk factors was high. Of the PDL, 46% reported at least one NCD. The most self-reported were anxiety and depression (34%), respiratory disease (17%) and HP (10%). Having a physical health NCD was independently associated with increasing age or drug dependence. They concluded that PDL, compared to the community, despite the high prevalence of risk factors for NCD, with the exception of respiratory diseases, are less common. However, mental health problems are more common. These differences are possibly due to the younger average age of prison populations, as the prevalence of risk factors has been reported to be high.</td>
<td>Quantitative, cross-sectional Level 6</td>
</tr>
<tr>
<td>A8</td>
<td>Davies M</td>
<td>United Kingdom</td>
<td>Not delimited. Bromley Briefings Prison Factfile: Winter records.</td>
<td>The PDL hospital admission rate for heart problems was 252 per 1,000 population – 24% lower than for age and sex, equivalent in the general population of 331 per 1,000 population. The most common diseases were HP (15.5%) and cardiac ischemia (10.1%). As for risk factors, the prison environment presents many challenges to maintaining good health, with limited opportunities for exercise and diet control as well as challenges for self-care. About 80% of PDL are also long-term smokers versus 15% in the community.</td>
<td>Not delimited. Level 7.</td>
</tr>
<tr>
<td>A9</td>
<td>Hachbardt NB, Hattori TY, Nascimento VF, Silva JH, Terças-Trettel ACP, Oliveira VKV, Atanaka M</td>
<td>Brazil</td>
<td>Assess cardiovascular risk in women deprived of liberty in a public prison. 120 female PDL.</td>
<td>91.5% of PDL were sedentary. Regarding health, 9.6% reported heart disease, 21.4% had a family history (first degree) of heart disease, 63.4% had HP, 37.8% had HP in first-degree relatives and 17.3% with a family history of diabetes. Thus, two PDL had self-reported HP and were undergoing drug treatment. However, BP measurements carried out in the three-year period (2017-19) showed that 20 (1.7%) participants had high BP, with values above normal. Most participants with BP above normal were young, under 30 years old (45%), mixed race (100%), with primary education (65%), low income (one to two minimum wages) (65%) and without had income (25%). Regarding cardiovascular risk factors, the majority were overweight (80%), had increased waist circumference (70%), 70% were smokers, 75% were sedentary and 60% had a history of pre-prison alcoholism.</td>
<td>Cross-sectional Level 6</td>
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<tr>
<td>A10</td>
<td>Camplain R Lininger MR Baldwin JA Trotter RT&lt;sup&gt;25&lt;/sup&gt; 2021 English</td>
<td>Estimate the prevalence of cardiovascular risk factors, including HP, diabetes, high cholesterol, smoking, alcohol consumption, and obesity among a sample of incarcerated individuals and compare prevalence estimates with the non-institutionalized population.</td>
<td>Of the PDL, 59.6% were overweight or obese, 36.8% reported fair or poor general health, 72.3% reported smoking cigarettes (72.3%), 60.7% drank excessively. Thus, PDL had a statistically higher prevalence of smoking and excessive alcohol consumption than in the community. Thus, 35.9% of PDL reported having been informed by a healthcare professional that they were hypertensive, compared to 27.1% in the community (data from the National Health and Nutrition Examination Survey (NHANES) were used for comparison); of these, 19.8% of PDL versus 23.5% in the community reported having received medication to treat HP. They concluded that screening for cardiovascular risk factors, preventive measures and interventions, such as healthy eating, physical activity, pharmacological interventions, during deprivation of liberty, may contribute to the prevention and management of cardiovascular risk factors and, eventually, CVD in PDL.</td>
<td>Cross-sectional Level 6</td>
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<td>A11</td>
<td>Howell BA Puglisi LB Aminawung J Domingo KB Elumna J Gallagher C Horton N Kazi DS Krumholz HM Lin HJ Roy B Wang EA&lt;sup&gt;26&lt;/sup&gt; 2022 English</td>
<td>Better understand the risk of CVD in people exposed to incarceration and the pathways by which cardiovascular risk accumulates over time.</td>
<td>It identified factors associated with inadequate control of CVD risk factors in people released from incarceration, seeking to understand the impact of these factors on the burden of CVD in this population.</td>
<td>Cohort, prospective observational Level 4</td>
<td></td>
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</tbody>
</table>

Source: the authors (2023).
Table 1. Description of the quality of studies assessed by the Newcastle-Ottawa Quality Assessment Scale adapted for cross-sectional studies and the Newcastle-Ottawa Quality Assessment Scale for cohort studies

<table>
<thead>
<tr>
<th>Study</th>
<th>Study design</th>
<th>Selection</th>
<th>Comparability</th>
<th>Result</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td>Representativeness</td>
<td>Sample size</td>
<td>Non-respondents</td>
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<tr>
<td>A1\textsuperscript{15}</td>
<td>Cross-sectional</td>
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<tr>
<td>A2\textsuperscript{16}</td>
<td>Cross-sectional</td>
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<tr>
<td>A3\textsuperscript{17}</td>
<td>Cross-sectional</td>
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<tr>
<td>A4\textsuperscript{18}</td>
<td>Cross-sectional</td>
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<tr>
<td>A5\textsuperscript{19}</td>
<td>Cross-sectional</td>
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<tr>
<td>A6\textsuperscript{20}</td>
<td>Not delimited – probably cross-sectional</td>
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<tr>
<td>A7\textsuperscript{21}</td>
<td>Cross-sectional</td>
<td>*</td>
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<tr>
<td>A8\textsuperscript{22}</td>
<td>Não delimita</td>
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<tr>
<th></th>
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<th>Cross-sectional</th>
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<td>A9&lt;sup&gt;23&lt;/sup&gt;</td>
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Source: the authors (2023).
In data qualitative analysis, five categories emerged, which are illustrated in Chart 3.

**Chart 3.** Categories that emerged in the coding process, Foz do Iguaçu, Paraná, Brazil, 2023

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<tr>
<td>Source: the authors (2023).</td>
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Subsequently, the five research categories are discussed.

**Hypertension prevalence**

In the “Hypertension prevalence” category, 18 references were coded, which corresponded to 8.23% of the analysis corpus. The rates found ranged from 10 to 35.9% among men deprived of their liberty (35.9%; 10%; 25.1%; 13.4%) and 1.7% among women deprived of their liberty. BP measurements in this population revealed a young population with a mean systolic BP of 132±13 mmHg.

Studies demonstrate a high rate of NCD (46%), whose prevalence of HP was lower only when compared to depression and respiratory diseases. The HP rates found were higher than those of the community in the same location (35.9% versus 19%). For PDL who have access to secondary care, heart disease is the most prevalent NCD.

In relation to hospital admissions, it was evident that PDL, compared to equivalent age and sex, had lower admission rates than the general population (252 versus 331 per 100 inhabitants), with HP and heart disease prevailing as causes of these, whose rate for HP was 15%.

**Sociodemographic characteristics of people deprived of liberty**

The “Sociodemographic characteristics of people deprived of liberty” category was made up of 28 references or 8.72% of the corpus. It demonstrated that PDL were, in the majority, male, 78.9% to 78.7%, instead of 13%, female, young, whose average age varied in the articles analyzed from 29.9 to 38 (29.9; 34; 29.18; 38), ages between 18 and 34 years old (47.7% and 63.3%), and only 4% were over 55 years old. PDL's mean average age has increased in recent years, as has the number of PDL.
As for education, they had few years of study. The majority did not complete high school (40%)\textsuperscript{16} and/or have high educational qualifications (38%)\textsuperscript{22}. This element seems to have an impact on occupation, since unemployment and low-income rates are prevalent. Thus, 31% were working prior to detention\textsuperscript{16} and 60% were unemployed\textsuperscript{22}, 48% without any annual income\textsuperscript{16} and/or with lower income than the community (45.3% had income lower to $1,000)\textsuperscript{25}. In the prison context, 60% of PDL were included in work activities.\textsuperscript{18}

Regarding race/ethnicity, there was considerable disparity between studies. In a study with PDL in the United Kingdom\textsuperscript{17}, 88% of PDL were white. In another survey in the United States of America\textsuperscript{21}, 50% were black, which can be inferred to be related to the different countries where the studies were carried out and their population profiles.

As for family ties, they seem to be maintained for the majority of PDL, as more than 70% had received visitors in the last week. However, as prison time increases, the rate tends to decrease.\textsuperscript{18}

In relation to social determinants of health, people who enter the criminal justice system are more likely than the general population to have previous exposure to abuse, homelessness and unemployment, which can result in complex health needs. Considering their vulnerability, they may present worse health outcomes. However, quantitative information/evidence about their health is still scarce, making it difficult to provide adequate care by health services, especially in the context of NCD.\textsuperscript{18,19,22,23}

Demographic factors and socioeconomic determinants may be responsible for the difference in the prevalence of illness between PDL and the community.\textsuperscript{22,23} It is worth noting that prison can maintain this cycle of suffering as PDL still experience violence in the last month in prison, with 37.5% reporting it.\textsuperscript{18} It is noteworthy that the prison population's health condition can represent a risk to the community's health as untreated diseases in this scenario can add to the burden of disease in the community and increase health expenses, in addition to individual harm.\textsuperscript{19}

It is considered that PDL aged 18-34 years presented 43% of the total NCD\textsuperscript{21}, and a higher cardiovascular risk was found among non-white men with a history of deprivation of liberty.\textsuperscript{16} However, despite all the limitations, the assessment of health conditions by the PDL themselves were positive, good in 34.9% and 29.2, respectively.\textsuperscript{19,25}
Risk factors for hypertension in people deprived of liberty

The “Risk factors for hypertension in people deprived of liberty” category covered the largest number of coded references, accounting for 90% or 36.87% of the entire corpus. Studies indicate a high rate of cardiovascular risk. For NCD among PDL, only 8.8% did not present them – the high risk is greater than 20%, with women presenting a higher number, despite having a low cardiovascular risk.\textsuperscript{20,22,25} In a study carried out in the United Kingdom, this rate reached 15.4%.\textsuperscript{17}

Thus, PDL have high rates of cardiovascular risk factors, such as HP and smoking, with CVD being one of the main causes of hospitalization and mortality in this population.\textsuperscript{26} Length of incarceration appears to promote modifiable risk factors for NCD as it promotes risky behaviors as well as tending to be associated with increased BP among PDL.\textsuperscript{17,18,21}

Considering that NCD develop over the long term, are related to modifiable risk factors and are combined with imprisonment, which makes it difficult to adopt healthy habits, this young population already has predisposing factors for CVD, demanding greater need for monitoring. Thus, PDL are at greater risk for cardiometabolic disease at a younger age than people in the community, and this elevated risk appears at a younger age than current screening guidelines.\textsuperscript{17,24}

The risk factors mapped were:

a) Illicit substances – there was a high consumption of illicit substances\textsuperscript{19} and interruption of prevention and treatment measures for substance abuse disorders.\textsuperscript{18} Cocaine use ranged from 24.2\% to 62.4\% (62.4\%\textsuperscript{20}; 24.2\%\textsuperscript{18}; 49.5\%\textsuperscript{19}; 8.0\%\textsuperscript{17}) in men and was 37.1\% in women\textsuperscript{20}, whose use increased with the time of deprivation of liberty\textsuperscript{18}; 37.5\% to 80\% used cannabis/marijuana in the last month (37.5\%\textsuperscript{18}; 80\%\textsuperscript{19}); 57.7\% used methamphetamine\textsuperscript{19}; 27\% had drug dependence in general\textsuperscript{22}. It is considered that this consumption is associated with acute coronary syndrome, cardiomyopathies, left ventricular hypertrophy, changes in the electrocardiogram and sudden death;

b) Smoking – PDL had a high prevalence of smoking (72.3\%\textsuperscript{26}), much higher than the rates found in the community (82\%\textsuperscript{20}; 53.2\%\textsuperscript{18}; 70\%\textsuperscript{24}; 1\%\textsuperscript{17}; 72.3\%\textsuperscript{25}; 80\%\textsuperscript{23}), higher among men compared to women (83.5\% versus 74.3\%\textsuperscript{20}). Use prior to deprivation of liberty reached 83\%\textsuperscript{22}; 39.1\% reported using vapes\textsuperscript{17};

c) Alcohol consumption – PDL showed a high prevalence of excessive alcohol consumption in the last 30 days, from 16\% to 70.1\% (16\%\textsuperscript{22}; 23.4\%\textsuperscript{18}; 76.1\%\textsuperscript{19}; 51.7\%\textsuperscript{24}; 60.7\%\textsuperscript{25}), and alcohol consumption increased with the time of deprivation of liberty\textsuperscript{18};

d) Sedentary lifestyle – physical inactivity was greater in women\textsuperscript{20}. Furthermore, 50\% of PDL reported performing physical activity before prison, with 72\% reporting lower levels of
physical activity in prison\textsuperscript{17,22} (48.7%). Opportunities for physical exercise are limited\textsuperscript{23}, and elements such as overcrowding and lack of infrastructure contribute negatively to the practice of physical activities and nutrition\textsuperscript{24}. However, PDL with longer periods of deprivation of liberty were more physically active, and male PDL had higher levels of physical activity than those in the community\textsuperscript{18}; however, diverging from this finding, in a Brazilian study 91.5\% of PDL were sedentary or insufficiently active\textsuperscript{24};

e) Psychosocial factors – low socioeconomic level, social isolation, depression, hostility, work and/or family stress are found in higher percentages in prison\textsuperscript{20};

f) Food – in relation to excess intake and abuse of unhealthy foods\textsuperscript{18,20}, in addition to the ability to control the diet at a minimum, 80\% reported eating fruit, 45\%, salads and/or vegetables, and 41\%, salt, daily\textsuperscript{22}, and the perception of diet quality decreased with the time of deprivation of liberty\textsuperscript{18}. In a study carried out in England, 49\% were eutrophic\textsuperscript{22}. In another Brazilian, it was demonstrated that PDL ate at least three meals a day, but with frequent consumption of processed foods\textsuperscript{24};

g) Overweight – overweight ranged from 46\% to 59.2\% (46\%\textsuperscript{22}; 80\%\textsuperscript{24}; 59.2\%\textsuperscript{25}), and obesity, from 10 to 22.8\%, and concomitant levels of overweight/obesity ranged from 22.8\% to 61.3\% (22.8\%\textsuperscript{25}; 61.3\%\textsuperscript{19}; 54.4\%\textsuperscript{24}; 40.1\%\textsuperscript{17}). Body Mass Index was found to have intermediate levels in an American study\textsuperscript{16};

h) High cholesterol – in 17.8\% to 23.1\% of PDL\textsuperscript{19,17}, treatment rates were lower for high cholesterol than those found in the community (9.1\% versus 15.3\%)\textsuperscript{25};

i) Challenges for self-care – these were related, for example, to the deprivation of keeping their medication with them, as they cannot stay in their cell, which could make it difficult to use the medication on a regular basis\textsuperscript{19};

j) Age – increasing age was associated with HP\textsuperscript{19};

k) Potential concentration of exposure to infectious diseases can contribute to cardiovascular risk\textsuperscript{19};

l) Difficulty accessing treatment for chronic health conditions, interruption and discontinuity of care for serious behavioral health conditions\textsuperscript{19};

m) Sleep – 46.9\% had changes in their sleep pattern\textsuperscript{24};

n) Family history – there were reports of 63.4\% of HP, 37.8\% in first-degree relatives\textsuperscript{24}.

A high rate of risk factors among PDL stands out, but rates of chronic illness may not be as significant when related to the average age of this population, which is mostly younger.\textsuperscript{23}

**Hypertension treatment**

In the “Hypertension treatment” category, three references were coded, which corresponded to 0.30% of the total corpus. It was explained that, when compared to data from the general population, the PDL of the analysis, when informed by a healthcare professional that they were hypertensive, had lower rates of medication treatment (19.8% versus 23.5%)\textsuperscript{25} and a low rate of HP treatment. In a study with Brazilian PDL, prevalence was 1.7%, and was much higher than the number of PDL on drug treatment.\textsuperscript{24}

In relation to access to health services, especially hospital services, PDL access less and miss a higher proportion of appointments than the general population and still have worse health conditions.\textsuperscript{22,23}

**Suggestions for actions/interventions in hypertension**

The “Suggestions for actions/interventions in hypertension” category totaled 25 coded references, corresponding to 11.5% of the corpus. The studies analyzed direct towards preventive actions, which need to have as a starting point the PDL’s reality, which allows planning and implementing prevention, health promotion and disease management actions, including with young people, especially proposing preventive interventions related to modifiable risk factors.\textsuperscript{16,18-20,25}

a) Smoking and illicit drug cessation – the integration of prison health and public health is essential to strengthen rehabilitation strategies; Among them is prison as a smoke- and drug-free environment;

b) Programs to encourage physical activity, especially among women;

c) Healthy eating – prioritizing non-processed foods, reducing sodium, such as the DASH diet. The assessment of food provided in the institution and non-institutional, in terms of micronutrients and macronutrients, must be carried out in order to guarantee the quality of food offered in prisons;

d) Weight control, BP, Body Mass Index;

e) Adherence to pharmacological treatment.\textsuperscript{16,20,25}

The initial approach to PDL, through screening for cardiovascular risk factors upon entry into the penal unit, in order to collect information early on possible behaviors/risk factors, providing primary prevention to improve current and future health conditions, including ensuring continuity of care/monitoring post-release, considering the increased risk of this group of people in younger age groups than people in the community.

To this end, PDL healthcare needs to be addressed systemically due to the complexity it adds to the social and environmental prison context. Prisons have the fundamental role of
adequately addressing and managing risk and illness, with a view to minimizing the overall impact of deprivation of liberty on public health in general.\textsuperscript{16,17,19-21,23,26}

\textbf{DISCUSSION}

In this review, cross-sectional studies prevailed (n= 8). In this regard, the potential of this type of research is considered in describing the characteristics of populations, risk groups and the contribution to health planning. However, due to the fact that they have measurements at a single moment and reveal associations between variables, they do not investigate the causal relationship.\textsuperscript{27} Therefore, the discussion of HP in prisons has few studies with greater theoretical-methodological robustness (n=1) and, therefore, the evidence is still fragile. Five thematic categories emerged from the analysis of the studies included in this review: Hypertension prevalence; Sociodemographic characteristics of people deprived of liberty; Risk factors for hypertension; Hypertension treatment; and Suggestions for actions/interventions in hypertension.

The “Hypertension prevalence” category found a percentage of the disease reported in PDL ranging from 10\% to 35.9\%. Supporting the findings of this review is the Brazilian context of data from the Risk and Protective Factor Surveillance System for Chronic Diseases by Telephone Survey (VIGITEL - \textit{Sistema de Vigilância de Fatores de Risco e Proteção para Doenças Crônicas por Inquérito Telefônico}), obtained through telephone calls with 27,093 people from Brazilian capitals, which indicate reporting rates of medical diagnosis of HP of 26.3\%.\textsuperscript{28} Furthermore, the study with data from the Brazilian National Health Survey on the Female Penitentiary Population and Prison Servants stands out, with a sample of 1,327 people, which found percentages of 24.4\%.\textsuperscript{1}

A study of 199 PDL in the United States of America found percentages of HP in PDL that were higher than those of the community in which they were located\textsuperscript{18}. In contrast, data from VIGITEL, Brazil and a study with PDL Brazileiras\textsuperscript{28,10} (2023) show a higher prevalence in the extramural context.

The profile of PDL found in studies regarding sociodemographic characteristics shows that they are, in the majority, male, young, with low education, who had high rates of unemployment and low income prior to arrest.\textsuperscript{16,18-22,25} A study with Brazilian PDL\textsuperscript{10}, which concluded that they were mostly poor and with low education, is in line with the data in this review.

It is worth returning to the social determinants of health (SDH), which are non-medical factors that influence health outcomes, related to people’s living conditions, which are a set of political and economic forces and systems, development agendas, norms and social
policies. They have an important influence on health inequities, which are unfair and avoidable differences in health status between different locations and countries. Examples of SDH are: income and social protection; education; unemployment and job insecurity; living conditions at work; food insecurity; housing, basic amenities and environment; early childhood development; social inclusion and non-discrimination; structural conflict; and reach of accessible and decent quality health services. Therefore, PDL’s living conditions have an impact on their illness process.

Among the references coded in the total corpus of the review, the category that included the largest number of coding was "Risk factors for hypertension in people deprived of liberty" (36.9% of the corpus), which showed high cardiovascular risk, HP and smoking among PDL, which were the main causes of mortality and hospitalization in this population.

PDL had a risk of cardiometabolic disease at a younger age than people in the community. Element that corroborates the study with 4,350 participants, carried out in the United States of America – of these, 288 former PDL –, concluded that incarceration was associated with a risk of future HP, left ventricular hypertrophy and a 12% cumulative incidence of HP among young people aged 23 to 35 compared to 7% with no history of incarceration. The authors suggest that such data may be related to stress and an increase in catecholamines caused by incarceration.

The risk factors mapped were use of illicit substances, smoking, use of alcoholic beverages, sedentary lifestyle, psychosocial factors, excessive eating and abuse of unhealthy foods, overweight, dyslipidemias, self-care challenges, age, boredom, increased exposure to infectious diseases, difficulty accessing treatment, inadequate sleep and family history. These are data that corroborate the study carried out based on self-reports from the Bureau of Justice Statistics (BJS), in the United States of America, indicating that PDL have increased rates of risk factors for CVD compared to individuals from the same population living in the community, especially HP and smoking.

The majority of PDL have limited access to healthcare, a high rate of drug, tobacco and alcohol use, and were victims of trauma prior to incarceration. Thus, the pattern of illness among PDL differs from the general population, related to the living conditions they have. Therefore, they arrive at prison with precarious health status, showing that social inequities between populations intensify multiple health disparities, which can be maintained if healthcare in prisons does not meet their demands.

A meta-regression carried out by Bondolfi et al. observed that incarceration results in an average weight increase of 5.3 kg, in addition to a change in Body Mass Index of 1.8
kg in two years, tending to be greater in the first two years to then stabilize. These repercussions were related to a sedentary lifestyle, lifestyle, unhealthy diet, forced smoking cessation, use of psychotropic medications and high levels of stress found in the prison environment.

It is emphasized that, although the rates of HP in PDL may not seem so significant, it is necessary to highlight the high rate of risk factors presented by this population, considering that they are mostly young subjects. As evidenced in a study in 57 Italian prisons, CVD, despite presenting lower rates in prison than in the free population, demonstrated an unusual prevalence for a population of young adults (average age of 39.6 years, reaching 11.4% of this population group), differing from the prevalence in the general population, which is higher in older adults. Among CVD, HP was the most recurrent, with 7.1% in that study.

Thus, PDL with HP are young, an element that aligns with what was pointed out about female PDL. The female prison population, although younger than the general female population, presented an illness profile similar to that of older women in the free population.

In this sense, the association between previous incarceration and increased risk of CVD may be partially explained by the increased predominance of cardiovascular risk factors in the prison population, especially related to HP, although the mechanisms are not known. BP control in such a context is essential to avoid complications resulting from it.

The “Hypertension treatment” category was the one with the lowest number of coded references (0.30% of the corpus), showing that a large proportion of PDL diagnosed with HP by a healthcare professional was not undergoing medication treatment as well as missed appointments more than the general population and having worse health conditions. PDL’s access to healthcare is limited by the fact that they have limited autonomy and, therefore, are unable to access the service when they wish, in addition to the fact that human resources are insufficient, specialized services are precarious, as well as difficulties in transportation (escorts), and there is an absence or little dialogue between health institutions.

Concerning the “Suggestions for actions/interventions in hypertension” category, presented by the studies, it is aimed at preventive actions, which need to have as a starting point PDL’s reality, which allows planning and implementing prevention, health promotion and disease management actions, including with young people, especially proposing preventive interventions related to modifiable risk factors and medication adherence. Interventions, in this sense, need to involve structure, physical activity, diet modification, nutritional education, smoking cessation.
It is noteworthy that, in the case of chronic diseases such as HP, measuring knowledge about the disease is a factor that affects the follow-up of therapy, especially because it is a silent and aggressive disease, depending on people’s knowledge, collaboration and participation.34 Thus, understanding the levels of knowledge in HP in PDL should guide the disease management process and health education activities by healthcare professionals and for this population.

It is worth remembering that health education is a fundamental tool for promoting health, healthier habits and preventing diseases in prisons. However, it is necessary to point out that health promotion actions in prisons are still basic and insufficient, and health promotion programs need to be based on the characteristics of the prison population, since, if planned based on the characteristics of the general population, they are doomed to failure and/or low results.35

The relevance of addressing all PDL entering the penal unit regarding cardiovascular risk factors and HP is emphasized.16,17,19-21,23 Furthermore, PDL must have access to care equivalent to that of the community, but adapted to their specific needs, with care centered on their needs.7 Furthermore, even if they are not limited to the current guidelines for the general population, they should be considered.

CONCLUSION

The analysis of the state of the art of care interventions used to control HP in PDL in Brazil and around the world demonstrated that studies that discuss HP in the prison context are still scarce and, for the most part, discuss it in terms of prevalence and risk factors rather than proposing actions/interventions, routines and/or care protocols. In relation to the methodologies used in studies, they lack greater theoretical robustness, since cross-sectional studies predominate, as, although very relevant, they do not present a causal relationship and/or present implementations of care protocols. In this sense, no specific care actions/interventions were found applied and/or used in PDL to control HP, which expresses the relevance of studies with this population. It is essential to develop care protocols based on their specificities/care needs, as they have health conditions that differ from those of the general population.

CONTRIBUTIONS

All authors contributed equally to the conception, study planning, data analysis and interpretation, writing and critical review.
CONFLICT OF INTEREST

The authors declare no conflict of interest.

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