






OBESITY AS AN ETIOLOGICAL FACTOR IN MAMMARY CANCER IN HUMANS AND DOGS: A ONE HEALTH APPROACH – LITERATURE REVIEW


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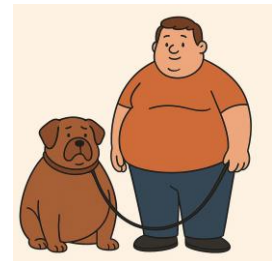


 **Obesity** is one of the most significant **public health** concerns and is recognized as a complex metabolic disorder with major impact on both **human and veterinary health**.


 **In humans**, it increases the risk of cardiovascular disease, type 2 diabetes, liver disorders, osteoarticular conditions, and cancer, particularly **breast cancer**. In **veterinary medicine**, obese dogs show a higher predisposition to similar conditions and to the **development of mammary tumors**.


 **The One Health** concept is therefore essential in analyzing the relationship between **obesity and breast cancer**, providing an integrated framework to simultaneously assess factors affecting human and animal health.


 This study **aims** to comparatively analyze the **relationship between obesity and the risk of mammary tumors** in humans and dogs.






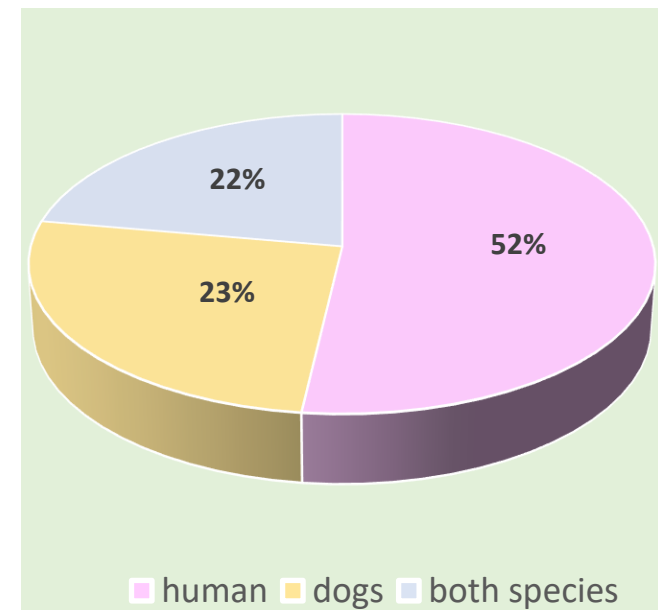
 This work is based on a structured **literature review** and meta-analytical approach designed to evaluate the **relationship between obesity and the development of mammary tumors** in both **humans and dogs**.

 A comprehensive search was conducted across major scientific databases, including PubMed, Web of Science, and Google Scholar.


 The following **keywords and combinations** were used: obesity, breast cancer, mammary tumors, adipokines, One Health and comparative oncology.


 A total of **27 articles** were analyzed in this review, of which **14 (52%)** focused exclusively on **human** studies, **7 (23%)** investigated **canine** populations, and **6 (22%)** addressed **both species** within a comparative or One Health framework.


Distribution of studies by species focus

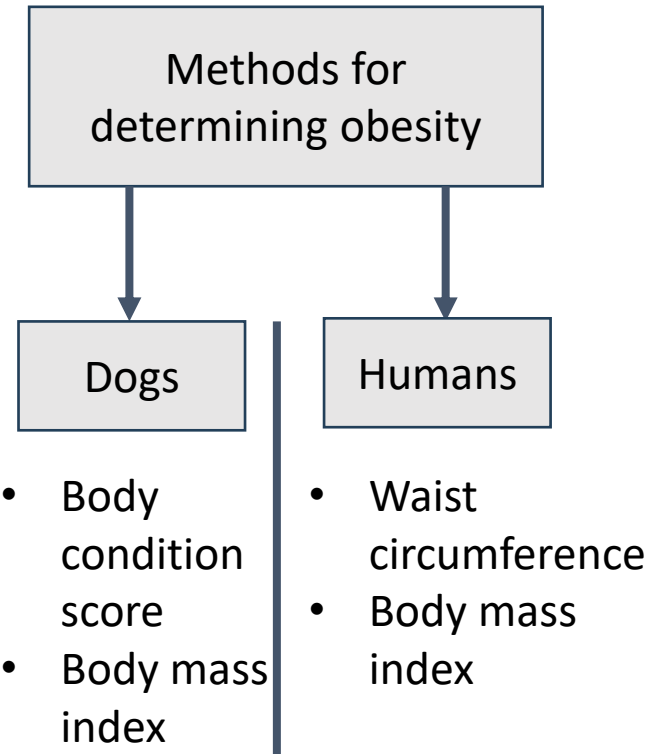







 This literature review integrates findings from **human and veterinary studies**, enabling the identification of shared biological mechanisms that connect **obesity** with the **onset and progression of mammary tumors** in both species.


 **Obesity** contributes to **carcinogenesis** through interconnected mechanisms including chronic inflammation, oxidative stress, and hormonal disruptions.


 **Obesity** induces significant alterations in the structure and function of **adipose tissue**, transforming adipocytes into a major source of **pro-inflammatory cytokines** that generate a metabolic environment conducive to **mammary cancer development**.

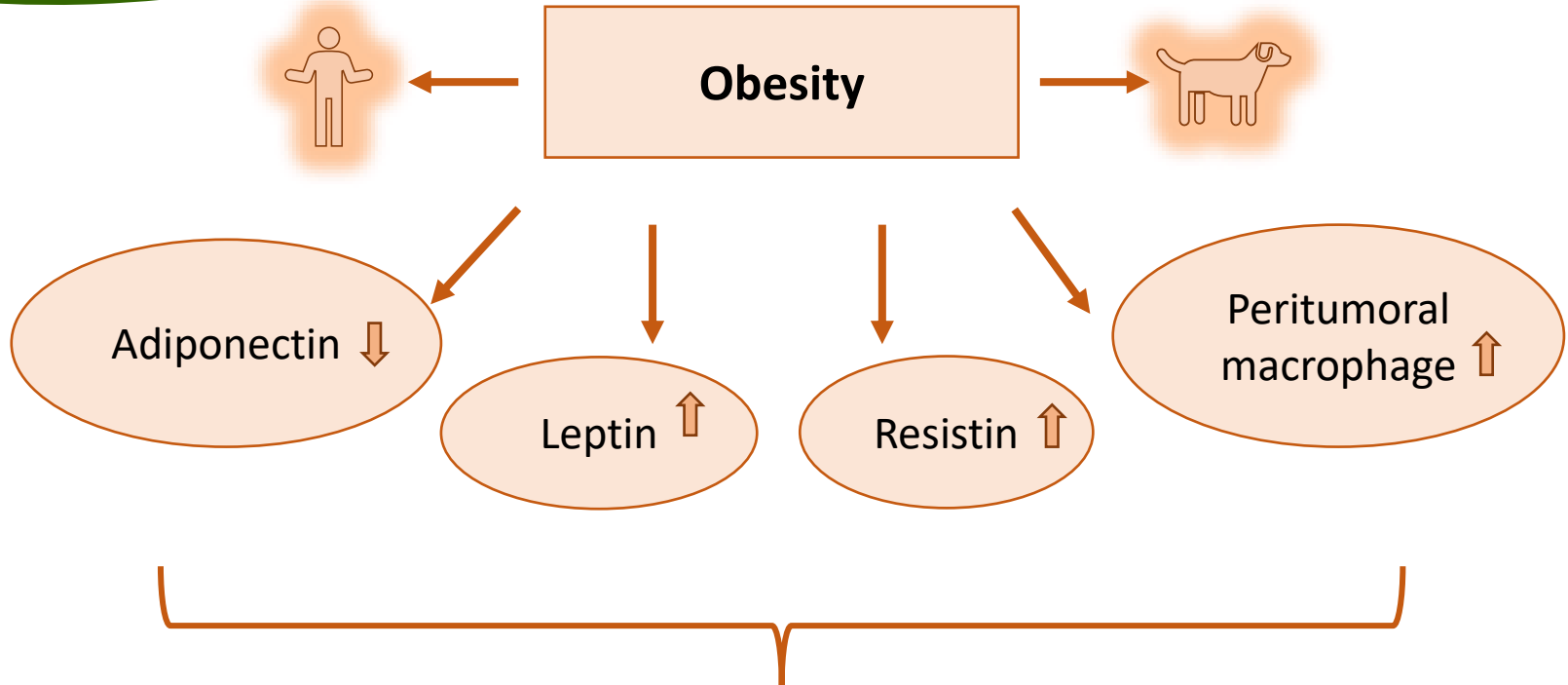




-  **Adipokines**, a group of bioactive molecules secreted by adipocytes, have been widely studied because they participate in mechanisms related to **cell proliferation, adhesion, and invasion**. They play a crucial role in regulating the biological behavior of tumor cells, with a wide range of adipokines showing distinct functions.
-  **Low plasma adiponectin** levels and reduced expression in mammary tumors are associated **with increased breast cancer incidence and poorer prognosis**. **Reduced adiponectin** among **obese individuals** promotes **tumor development**. **Overweight or obese female dogs** had fewer adiponectin-positive mammary tumor cells, and **positive expression** was associated **with fewer grade III tumors and reduced lymphatic invasion**.
-  **Hyperleptinemia** has been associated with cardiovascular disease, acute pancreatitis, hepatocellular and renal carcinoma, and lung, prostate, colorectal, and **breast cancers**. Its relationship with breast cancer involves mechanisms that enhance estrogen activity, contributing to **proliferation of mammary epithelial cells**. **Dogs** exhibit **obesity-induced hyperleptinemia** similar to humans.

 **Resistin** is associated with metabolic, inflammatory, and **neoplastic disorders** and is considered a **prognostic marker in human oncology**. It promotes epithelial and mesenchymal proliferation in **mammary tissue**, processes critical for **tumor development and metastasis**. Serum **resistin** levels were found to be approximately **three times higher in obese female dogs** than in those with an ideal body weight, a pattern that mirrors observations reported in human obesity

 **Higher peritumoral macrophage** density has been identified in obese individuals of **both species**, correlating with **lymphovascular invasion and poor prognosis**. The prevalence of **tumor-associated macrophages** is **higher in malignant than in benign tumors** in both **humans and dogs**, suggesting that **macrophage density** is a **hallmark of mammary tumor malignancy**.



Mammary tumors








One Health Conclusions and recommendations

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 **Obesity** is a major risk factor for the **development and progression of mammary tumors** in both **humans and dogs**. **Shared mechanisms**—including chronic inflammation, hormonal dysfunction, and adipokine imbalance—demonstrate the **unity of biological processes across species**.

 The **One Health** concept promotes interdisciplinary collaboration among human medicine, veterinary medicine, and environmental sciences to address **shared diseases** in an **integrated manner**. In the context of **obesity**, this approach is essential as **owner lifestyle** directly **influences pet health**.

 It is essential that **new studies** be conducted to further clarify the mechanisms linking obesity and mammary tumors in both dogs and humans, as **several pathways** remain **insufficiently understood**, and the **use of the dog** as a natural **translational model** offers an important opportunity **to advance comparative oncology** research and guide the development of integrated, targeted **therapeutic strategies**.



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Thank you for your attention!

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December 3-5, 2025, București



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