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Spexin Hormone and Its Relationship With Age, Sex, and Smoking in Heart Attack Patients

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Abstract

Study focused on anthropometric measurements in addition to smoking , its relationship with Spexin hormone (SPX) and its role in heart attack risk for both sexes. 91 samples were collected from people with heart attacks and 91 likewise were collected from people to be control group. Outcomes demonstrated that level of hormone decreased with age, while body mass index (BMI) increased with age for group suffering heart attack compared with control group, incidence rate in males is 2.25 times higher than in females, age is a major factor that affects hormone levels and reduces its activity, males of all age groups usually have a higher infection rate than females of the same age groups. In addition, smokers are more susceptible to heart attacks compared to non-smokers.

Finally, this study discovered a connection between a decline in spexin as well as rise in risk factor for heart attack, which has a strong role, especially in male smokers and those who are overweight.

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هرمون السبكسين وعلاقته بالعمر، الجنس والتدخين لدى مرضى النوبة القلبية

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الخلاصة:

ركزت الدراسة على القياسات الأنثروبومترية بالإضافة الى التدخين وعلاقتها مع هورمون السبكسين (SPX) ودورها للإصابة بالنوبة القلبية لكلا الجنسين، حيث تم جمع 91 عينة لمصابين بالنوبة القلبية و91 عينة كمجموعة سيطرة. أظهرت النتائج أن انخفاض مستوى الهورمون مقابل التقدم بالعمر بينما زيادة مؤشر كتلة الجسم (BMI) مع التقدم بالعمر لمجموعة لمصابين بالنوبة القلبية مقارنة مع المجموعة الضابطة وان نسبة الاصابة لدى الذكور اعلى مما لدى الاناث بمقدار 2.25 مرة ، والعمر عامل رئيسي يؤثر على مستويات الهورمون ويقلل من نشاطه وعادة ما يكونن الذكور بكافة الفئات العمرية اعلى نسبة اصابة من الاناث لنفس الفئات العمرية. فضلا عن ان المدخنين أكثر عرضة للإصابة بالنوبات القلبية مقارنة مع غير المدخنين.

اخيرا اكتشفت هذه الدراسة وجود علاقة بين انخفاض هورمون السبكسين وزيادة عامل خطر الإصابة بالنوبة القلبية، والتي لها دور قوي، خاصة لدى الذكور المدخنين وممن لديهم زيادة بالوزن. الكلمات الدالة: هورمون السبكسين (SPX)، النوبة القلبية، العمر، الجنس، النوبة القلبية.

Introduction:

The heart is placed in the middle of the chest, between the lungs, in an area known as the mediastinum behind the sternum, with two-thirds of the heart to the left and one-third to the right of the midline [1,2] It is somewhat larger than a fist and weighs approximately 250 gm in women and 297 gm in men [3].

Cardiovascular illnesses are the leading cause of death worldwide, accounting for around 17.9 million deaths per year, according to World Health Organization data. These diseases cause more deaths than any other cause, particularly in low- and middle-income nations. In most industrialized countries, these diseases account for more than half of all fatalities among middle-aged adults and one-third of all deaths among the elderly. Heart attacks, also known as Myocardial infarctions (MI), are still a serious global health concern [4]. A Myocardial Infarction, or heart attack, happens when blood stops flowing totally or partially to a region of the heart, causing the heart muscle to suffer from a lack of oxygen supply, and one of the coronary arteries that supply the heart with blood becomes blocked due to an unstable accumulation of plaques, white blood cells, cholesterol, and fats [5].

Spexin (SPX) is a neuropeptide and is also referred to as Neuropeptide Q (NPQ) [6]. It is a polypeptide of 14 amino acids encoded by the gene C12orf29 [7]. It was first identified in 2007 by using a hidden Markov model [8]. SPX is widely expressed in various tissues and organs including the heart, brain, lung, liver, thyroid, adrenal gland, muscle, as well as adipose tissue, ovaries, testes, stomach, and various parts of the digestive system [9].

The broad distribution of Spexin hormone (SPX) in both central and peripheral tissues in many living species shows that it is important in a variety of physiological and pathological processes [10]. SPX has been linked to the physiology/pathophysiology of the reproductive, gastrointestinal, cardiovascular, and endocrine systems, specifically food intake and energy (carbohydrate/fat) metabolism [11].

Materials and methods:

Heart Attack Patients Group: 91 heart attack patients, this study comprised patients diagnosed by professionals at Ibn-Sina and Al-Jumhuri Teaching Hospitals / Al-Mosul in Iraq between October 26, 2023 and March 1, 2024. The patients' ages varied from 30 to ≥ 70 years, and clinical information was obtained by a specially constructed questionnaire.

Control group: The study included 91 youthful, fertile women aged 30 to ≥ 70 .

After 12 hours, blood samples were taken in the morning during the initial follicle phase of fasting for Spexin hormone (SPX) and for both group. SPX was measured by ELISA using a specific test kit. While Body Mass Index (BMI) was calculated using the following formula:

$$\text{BMI}(\text{Kg}/\text{m}^2) = \text{weight}(\text{Kg}) / \text{length}(\text{m}^2)$$

Finally, SPSS software was used to analyze the data.

Results and Discussion:

Comparison of SPX and BMI between patients and healthy subjects (control group) based on ages:

progressively age, the levels of circulatory spexin diminish, implying that this peptide may play a role in aging-related activities and illnesses [12]. It's probable that weight gain causes circulating spexin levels to drop with age because of the strong inverse association between BMI and spexin levels. Kidney tubular epithelial cell proliferation may be decreased with age [13], and result in a decrease in the hormone and steroidal output of the adrenal glands [14]. Spexin synthesis probably declines with age because to tissue damage to the kidney, adrenal glands, and other organs. In the meanwhile, there might be additional factors contributing to the drop in circulating spexin [12].

Although heart attacks occur primarily in older adults, 4-10% of patients who have acute heart attacks are younger than 40-50 years, and the risk factor profile of young patients may differ from that of older patients, including: This increases the prevalence of obesity and overweight [15,16].

Table-1: Comparison of SPX and BMI between patients and healthy subjects (control group) based on ages.

Age (years) Variables	SPX (pg/ml) (Mean $\pm$ SD)		P-value	BMI (Kg/m ²) (Mean $\pm$ SD)		P-value
	Control	Patients		Control	Patients	
(30-49)	466.50 $\pm$ 97.75	317.73 $\pm$ 78.48	<0.01	27.03 $\pm$ 2.41	28.54 $\pm$ 2.95	N.S
(50-69)	448.32 $\pm$ 90.85	287.58 $\pm$ 73.0	<0.001	26.11 $\pm$ 1.68	29.68 $\pm$ 3.56	<0.001
(≥ 70)	519.16 $\pm$ 77.80	276.46 $\pm$ 30.62	<0.001	25.18 $\pm$ 1.18	29.24 $\pm$ 2.88	<0.05

*Significant differences at $P \leq 0.01$, **Significant differences at $P \leq 0.05$, ***Significant

differences at $P \leq 0.001$, N.S. = No significant differences

The relationship between age and sex for patients with Heart Attack:

The results in Figure 1 showed women were far more likely than males to appear without chest pain, and they also had greater mortality rates, particularly in younger age groups. However, as people aged, the differences between the sexes in terms of clinical presentation without chest pain and mortality decreased. In analyzing sex differences in cardiac events, age is a significant factor, which is consistent with the Canto *et al.*, 2012 study [17].

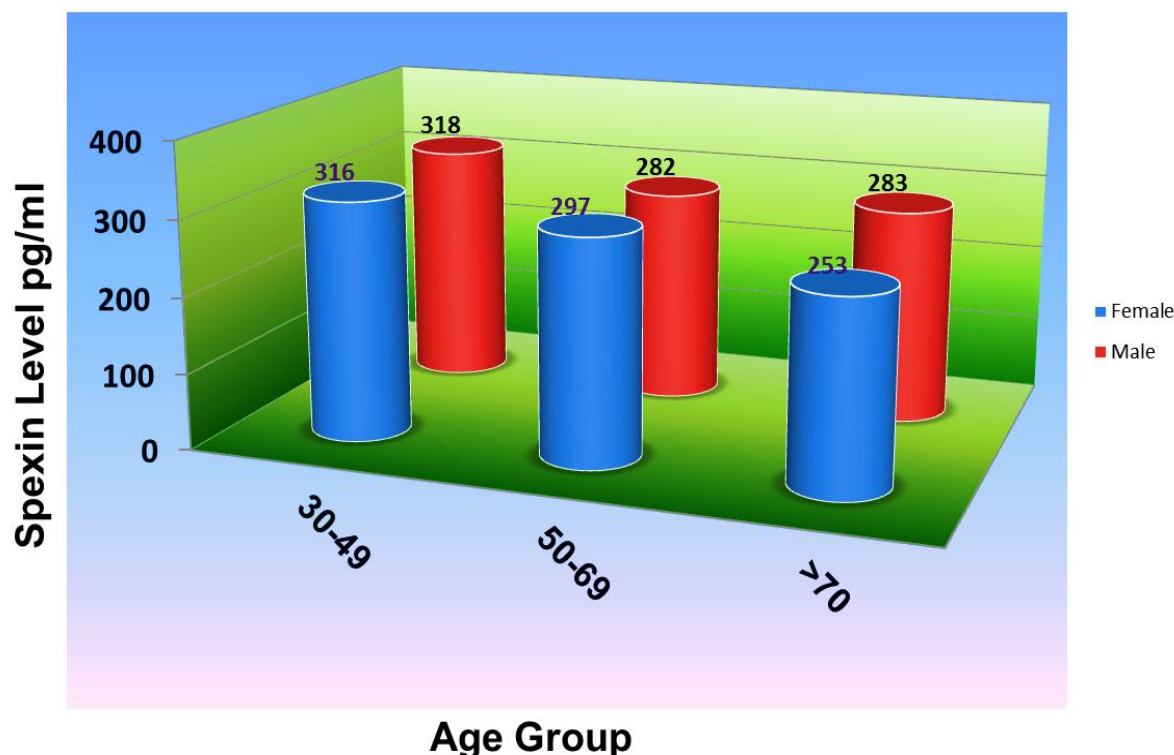


Figure-1: The relationship between age and sex for patients with Heart Attack

The incidence of heart attacks among women and men:

The results in Figure 2 showed that the incidence rate in males is 2.25 times higher than in females, Men are generally three times more likely than women to suffer a myocardial infarction, however if a woman has specific cardiovascular disease risk factors, she may "catch up" slightly [18].

It is believed that the reason for the delayed onset of coronary heart disease in women compared to men is the protective role played by the hormone estrogen circulating on the vascular lining through complex mechanisms through which estrogen influences the risk of coronary heart disease, which is not fully understood, if these effects include Nitric oxide is released directly into the

vascular system, helping to widen blood vessels, regulate prostaglandin production, and inhibit smooth muscle development [19].

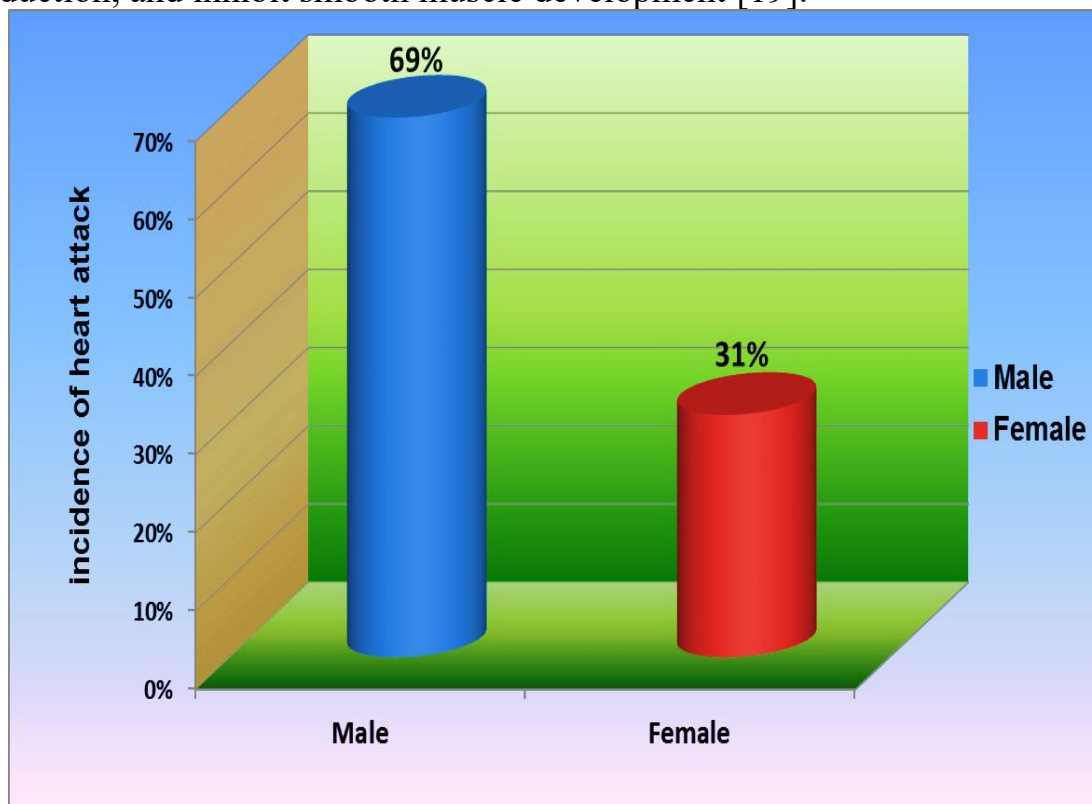


Figure-2: The incidence of heart attacks among women and men

Percentage of smokers among heart attack patients and in both sexes:

The results in Figure 3 when comparing the proportion of smokers and non-smokers between heart attack patients and in both sexes, showed that the incidence rate was higher in smokers, it is known that smoking highlights the main risk of cardiovascular disease, treating 10% of the total causes of heart disease, according to WHO data, with tobacco use causing the death of nearly six million people worldwide [20]. The main mechanisms that have been documented in the literature related to smoking-induced vascular apoptosis are oxidative stress, inflammation, impaired function of the oxygen and potassium pump (Na^+/K^+ ATPase), and cigarette smoke contains many transparent and opaque oxidants, including O_2^- and radicals. Hydroxyl (OH) and peroxides (ROOH), in addition, lead to resistance to nicotine, increased stimulation of nicotinic acetylcholine receptors in viral endothelial cells, and dilation of blood vessels as a result of a defect in the potassium oxide pump, which allows cellulones to flow into the cells. This lack of variation in highly randomly generated electrolytes results in cell cells [21].

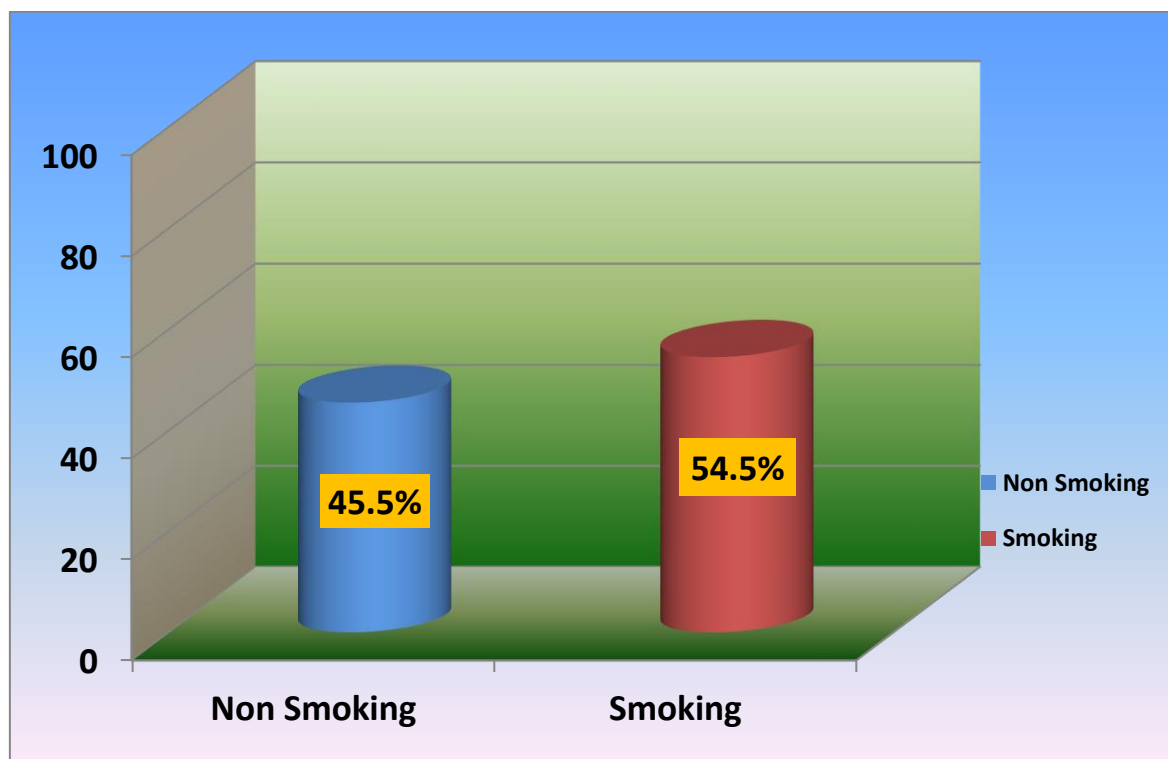


Figure-3: Percentage of smokers and non-smokers among heart attack patients and in both sexes

Conclusion:

This study discovered a relationship between low Spexin hormone and an increased risk factor for heart attack, which has a strong role, especially in people who are obese and with age, excess weight does not only build up around the waist, but it also builds up around organs too, and one of those being the heart. This puts you at a much higher risk of a heart attack. However hard it may seem, losing weight is something you really need to start doing if you want to live longer.

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