



ORIGINAL ARTICLE

Novel Study of the Effect of Spexin Hormone on Heart Attack Disease

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KEYWORDS

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ABSTRACT: Spexin hormone (SPX) is a new peptide that has multiple activities in adipose tissue, including energy balance regulation and fatty acid uptakend and related metabolic diseases its physiological significance in the cardiovascular system remains mostly undefined. The aim of the current study was to determine the potential role of Circulating levels of SPX in heart attack illness and potential role in preventing through the measurement spexin hormone, lipid profile, atherogenic risk factor, and body mass index in the serum of 91 heart attack patients and 91 control groups. The age ranges were thirty to seventy-eight, and the study found a substantial drop in spexin hormone and high-density lipoprotein cholesterol levels in comparison with the group in control ($P \leq 0.001$). Additionally, all of the following were significantly higher than in the healthy group: body mass index, triglycerides, low-density lipoprotein cholesterol, very low-density lipoprotein cholesterol, total cholesterol, and atherogenic risk factor at ($P \leq 0.001$). The study indicated a substantial relationship between spexin hormone, total cholesterol, and low-density lipoprotein with a high body mass index. As a result, the study proved that a decrease in spexin hormone is a novel indicator of an increase in heart attack disease and has the potential to be employed as an early diagnostic marker in heart attack patients.

INTRODUCTION

Heart disease is the most common cause of death [1]. When part of the heart muscle does not receive enough blood supply, heart attacks (also called myocardial infarction) occur; numerous studies have shown that the lipid profile plays an important role in the course of heart disease. Increases in total cholesterol (TC), and triglyceride (TG) levels my effect on the constriction and abstraction of arteries in the heart, both of which are strongly associated with an increased risk of heart disease [2]. Furthermore, elevations in low density lipoprotein cholesterol (LDL-C) levels could induce arteriosclerosis due to buildup of LDL-C in the intima-media of the artery, which could subsequently stimulate thrombocytopoiesis [3]. People with higher levels of

higher-density lipoprotein cholesterol (HDL-C) might be at a lower risk of heart disease or be protected against it [3, 4].

Spexin is a peptide hormone consisting of fourteen amino acids identified in 2007 utilizing bioinformatics techniques [5]. SPX is widely dispersed throughout central and peripheral tissues, and studies in fish have revealed that it affects numerous biological processes, including the metabolism of lipids and sugar, obesity, and dietary consumption [6]. Early research has shown that SPX has a physiological function in smooth muscle contraction [7-9]. This study focuses on the metabolic-protective properties of SPX and provides novel insights into the biochemistry and methodology of hormones in

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heart attack disease, which is a major global health concern.

Subjects and methods

Subjects and blood sampling

This study included ninety-one patients with heart attack disease for both sexes. Ibn Sina Hospital and Mosul Center for Cardiac Medicine and Surgery, A cross-sectional study was undertaken in a hospital setting, and their body mass index (BMI) varied between 23.74 and 37.97 kg m⁻². This study included ninety-one men and women as controls. The range of BMI was of 23.80 to 29.40 kg m⁻². For both group the range in age between 33 and 85 years old.

The two groups' blood samples were collected, Gels (a gel and clot activator) were put to a 5 ml test tube, centrifuged for separating the serum, and stored in a deep freezer at -20°C for future analysis. To accommodate for volatility in analytical results, materials were examined in sets of one hundred. Before beginning the investigation, each of the specimens were permitted to come to room temperature.

Biochemical analysis

A specialized kit was used for each variable in the Spexin hormone test, which is based on the ELISA method. A spectrophotometer was used to measure the lipid profile, which includes Total cholesterol level, HDL-C (High density lipoprotein cholesterol), and TG (Triacylglycerol), using Biolabo kits from France.

The Friedewald equations were used to indirectly determine the levels of LDL-C (Low density lipoprotein cholesterol) and VLDL (Very low density lipoprotein cholesterol):

$$\text{LDL-C mg dl}^{-1} = \text{Cholesterol} - \text{HDL} - \text{G} / 5 \quad (1)$$

$$\text{VLDL-C (mg dl}^{-1}) = \text{Triglyceride} / 5 \quad (2)$$

While the following formula was used to calculate Body Mass Index (BMI):

$$\text{BMI (kg/m}^2\text{)} \text{ is calculated as follows: weight (kg) / length (m}^2\text{)} \quad (3)$$

Statistical analysis

All data were analyzed using SPSS. Two groups were compared using the T-test, more than two groups were compared using the Duncan's test, and the associations between the the entire number of controls and the total number of patients were examined using Pearson's correlation coefficient [10].

RESULTS

Heart attack patients' levels of spexin hormone and clinical biochemistry variables were compared to those of the healthy group

The Table 1 results demonstrated a considerable decrease with a level of the spexin hormone (SPX) at P=0.001 in patients compared to the control group, patients had significantly higher levels of total cholesterol, triglycerides, and VLDL-C., VLDL-C, atherogenic risk factor, and BMI in patients compared with the control at P = 0.001, respectively. Finally, the results also showed a significant decrease in the level of HDL-C.

Table 1. Heart attack patients' levels of spexin hormone and clinical biochemistry variables were compared to those of the healthy group.

Clinical Biochemistry Variables	Heart Attack Patients (Mean ± SD)	Control –Group (Mean ± SD)	P-value
SPX (pg mL ⁻¹)	293.44± 70.0	463.57± 90.55	0.001
Total Cholesterol (mg dL ⁻¹)	190.31± 35.45	146.18± 16.17	0.001
Triglyceride (mg dL ⁻¹)	156.5± 31.97	128.00± 22.44	0.001
HDL-C (mg dL ⁻¹)	33.09± 4.92	44.53± 7.93	0.001
LDL-C (mg dL ⁻¹)	125.92± 31.92	76.04± 18.38	0.001
VLDL-C (mg dL ⁻¹)	31.30± 6.39	25.60± 4.48	0.001
Atherogenic Risk Factor	5.91± 1.53	3.37± 0.68	0.001
BMI	29.32± 3.3	26.07± 1.73	0.001

A comparison of the levels of hormone and clinical

biochemistry markers in heart attack individuals with

varying body mass index

The results demonstrated a progressive increase in the levels of total cholesterol, triglycerides, LDL-C, and VLDL-C, and atherogenic risk factor with an increase in the BMI at (P = 0.001, P = 0.01, P = 0.01, P = 0.01, P =

0.05), respectively. A decrease in the level of SPX appeared in patients suffering from a heart attack with an increase in BMI at P = 0.001 as the results in Table 2.

Table 2. A comparison of the levels of hormone and clinical biochemistry markers in heart attack individuals with varying body mass index.

BMI(Kg/m ²)	(18-24.9)	(25-29.9)	(30-34.9)	(35-39.9)	
Clinical	N=7	No= 58	No= 22	No= 4	P-value
Biochemistry Variables	(Mean ± SD)	(Mean ± SD)	(Mean ± SD)	(Mean ± SD)	
SPX (pg ml ⁻¹)	446.09±39.39 (c)	295.39±55.76 (b)	281.35±65.79 (a,b)	215.21±26.1 (a)	0.001**
Total Cholesterol (mg dL ⁻¹)	153.79±14.64 (a)	180±28.06 (a,b)	206.52±38.31(b,c)	231.17±28.05 (c)	0.001**
Triglyceride (TG) (mg dL ⁻¹)	129.50±18.69 (a)	148.85±27.88 (a,b)	164.97±32.53 (b)	200.0±22.1 (c)	0.01**
HDL-C (mg dL ⁻¹)	34.33±4.50 (a)	32.83±4.73 (a)	33.64±5.15 (a)	31.57±7.13 (a)	NS
LDL-C (mg dL ⁻¹)	93.55±19.13 (a)	117.08±26.33 (a,b)	139.87±33.63 (b,c)	159.42±26.0 (c)	0.01**
VLDL-C (mg dL ⁻¹)	25.90±3.73 (a)	29.77±5.57 (a,b)	32.99±6.50 (b)	40.0±4.42 (c)	0.01**
Atherogenic Risk Factor	4.56±1.02 (a)	5.62±1.35 (a)	6.29±1.58 (a,b)	7.53±1.66 (b)	0.05*

*Significant differences at P ≤ 0.05, **Significant differences at P ≤ 0.01, NS. = No significant differences, a, b, C denote Duncan-test

Correlation of the effect of spexin hormone (SPX) for

heart attack patients, depending on lipid profile variables

Spexin hormone (SPX) showed in Table 3 There was a negative connection between total cholesterol, triglyceride, LDL-C, VLDL-C, atherogenic risk factor, and BMI readings in patients versus controls. Similarly, studies conducted on obese and normal weight women have found an inverse relationship between spexin and lipid levels [11, 12]. Surprisingly, blood spexin concentrations were found to be favorably linked with lipoprotein HDL-C in heart attack patients [5]. Overall, there have been few researches on the influence of spexin

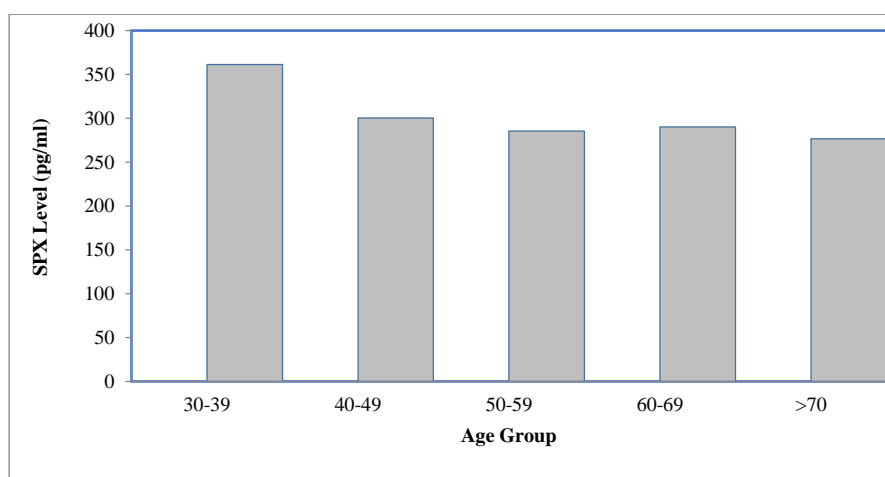
on cardiac works; however the impact of the hormone on lipid profile may be explored as a therapy possibility for heart attack-related disease in future years.

The spexin hormone level in individuals who have had a heart attack, in various age groups, and both sexes

The spexin hormone level in individuals who have had a heart attack, in various age groups, and both sexes as Figure 1.

Table 3. Correlation of the effect of spexin hormone (SPX) for heart attack patients, depending on lipid profile variables

Biochemical variables	Correlation coefficient	p-value
Total Cholesterol (mg dL ⁻¹)	-0.5947	0.001
Triglyceride (mg dL ⁻¹)	-0.3734	0.001
HDL-C (mg dL ⁻¹)	0.2594	0.001
LDL-C (mg dL ⁻¹)	-0.6043	0.001
VLDL-C (mg dL ⁻¹)	-0.3734	0.001
Atherogenic Risk Factor	-0.5352	0.001
BMI	-0.6085	0.001

**Figure 1.** The spexin hormone level in individuals who have had a heart attack, in various age groups

DISCUSSION

The level of spexin hormonal of heart attack patients compared with the control group showed a significant decrease in the concentration of the spexin hormone (SPX); this is mainly due to high levels of low-density lipoprotein cholesterol (LDL-C), which is the “bad” cholesterol [13]. SPX occurs frequently in hormonal and endothelial cell membranes [14], and it is thought to play a role in disorders of metabolism such as diabetes, MetS., and obesity. Because of its possible regulatory involvement in prevention of satiety and energy intake, SPX mRNA levels are changed in the forebrain area under different feeding conditions or metabolism conditions [15]. Furthermore, SPX has been shown to improve mitochondrial dysfunction and imbalance in energy homeostasis of cardiomyocytes due to exposure to hypoxia, thereby highlighting the potential importance of SPX in the treatment of cardiovascular diseases [6]. The findings also revealed a substantial rise in lipid profile concentrations in Patients in comparison with the healthy

group. Heart attack disease is a range of conditions that combine circulatory and cardiac processes including cerebrovascular illness, rheumatic heart disorder, myocardial infarction (MI), heart failure, coronary artery disease, and atherosclerosis [5], dyslipidemia, defined as elevated blood levels of LDL lipids, overall cholesterol, or triglyceride and decreasing HDL-C level, is an independent predictor of advancement of heart attack illness. [16]. Finally, a high body mass index increases the probability of heart failure, perhaps due to increased pressure on the circulatory system, which causes an increased load on the heart [17].

It was found that people with an increase in BMI have a higher percentage of fat compared to people with a lower BMI, and although HDL-C does not directly affect it, it may indirectly affect metabolic processes, which increases the risk of heart attack and the complications that may occur because of it [5]. A decrease in the level of SPX appeared in patients suffering from a heart attack

with an increase in BMI, This suggests SPX may be implicated in the controlling of fat mass, weight, and balance of energy [18, 5].

The study, which included both heart attack patients and healthy persons, discovered an inverse relationship between SPX and lipid levels. This is similar with what earlier research conducted in obese and healthy women discovered that the levels of spexin & fats showed inversely associated [11, 12]. Surprisingly, blood spexin levels were observed correlate favorably with HDL-C in heart attack patients [5]. Overall, there have been few researches on the impact of Spexin on heart activity, However, the impact associated with this peptide on levels of lipids may be regarded as an option for therapy for patients with heart attacks in the future. Finally, Figure (1) seen a decrease in the spexin level with age, indicating the potential role of this peptide in functions and disorders associated with aging in heart attack patients. This is consistent with a study conducted by Lin and his group in 2018, in which they discovered that circulating spexin levels adversely correlated with aging, weight, fasting blood sugar, and triglyceride in healthy adult women [11]. The results of this study showed that the spexin hormone is a novel indicator of an increase in heart attack disease and has the potential to be employed as an early diagnostic marker in heart attack patients

CONCLUSIONS

The results of this study showed that the spexin hormone is a novel indicator of an increase in heart attack disease and has the potential to be employed as an early diagnostic marker in heart attack patients.

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ETHICAL CONSIDERATION

The study was authorized by our organization (37172/R.A.D, 20/9/2023) and the board of review of authors. It was conducted in accordance with institutional policy, all applicable national laws, and the principles of the Helsinki Declaration.

Conflict of interests

The author confirm that this article content has no conflicts of interest

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