



## Evaluation of the Effect of Smoking on Nesfatin-1 Level

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### Research Article

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### ABSTRACT

#### Abstract

Nesfatin-1 is a recently discovered adipocytokine that is believed to regulate food intake and is linked to body mass index. While its precise mechanism of action remains unclear, a deeper understanding of how nesfatin-1 interacts with metabolic diseases, inflammation, and insulin resistance could have significant implications for the treatment of a wide range of conditions, including cardiovascular disease. Smoking is a complex issue with roots in social, cultural, and economic factors that can contribute to nicotine addiction. Additionally, nicotine's ability to stimulate the mind and promote feelings of relaxation can create a positive feedback loop that makes it difficult to quit. Unfortunately, there is limited research on the effects of smoking on Nesfatin-1 levels. However, one study found that women who smoke tend to have lower levels of Nesfatin-1. To build on this finding, the present study aims to further investigate nesfatin-1 levels in both smokers and non-smokers.

A total of 70 participants, smokers (n=35) and non-smokers (n=35), were included in the study. The participant's gender, age, height and weight, body mass index, and nesfatin-1 levels were measured and compared. The SPSS 23.0 program was used to evaluate the data statistically. Data were evaluated with a t-test. The error level was taken as 0.05.

Serum Nesfatin-1 levels were significantly higher in smokers (13.73± 3.11) than in non-smokers (8.63 ± 0.91) (t=-9.315, p<0.01). No significant difference was found between other parameters in the smoker and non-smoker groups.

The study has shown that individuals who smoke display higher levels of Nesfatin-1 compared to non-smokers, indicating a correlation between smoking and Nesfatin-1. However, further investigation is required to understand the mechanism behind this increase. It is hoped that continued research will unveil the potential of Nesfatin-1 in treating human obesity.

**Keywords:** Smoking, Nesfatin, Nutrition

## Sigara Kullanımının Nesfatin-1 Düzeyi Üzerine Etkisinin Değerlendirilmesi

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### Öz

Nesfatin-1, besin tüketimini düzenleyen ve vücut kitle indeksi ile ilişkili bulunan yeni bir anoreksojenik adipositokindir. Nesfatin-1'in vücutta ne şekilde etkili olduğu yeterince incelenmemiştir. Nesfatin-1'in metabolik hastalıklar, insülin rezistansı ve enflamasyondaki rolü tam olarak anlaşılması durumunda başta kardiyovasküler hastalıklar olmak üzere birçok hastalığın tedavisine katkı sağlayabilir Sigara içme, özellikle nedenleri açısından önemli bir ruhsal-toplumsal sorundur. Toplumsal, kültürel ve ekonomik etmenler nedeniyle nikotin bağımlılığı sık gelişmektedir. Nikotinin aynı zamanda ruhsal açıdan uyarıcı nitelik taşıyan bir madde olması, duyu durumunu olumlu yönde değiştiren, rahatlatıcı etkisinin olması, bir yanda kullanımını artırmakta, diğer yandan sigaranın yarattığı sonuçlara duyarsızlık yaratmakta, bırakma çabalarını azaltmaktadır. Sigara kullanımının Nesfatin-1 üzerine etkisiyle ilgili elde edilen veriler çok sınırlıdır. Yapılan bir çalışmada sigara içen kadınlarda Nesfatin-1 düzeyi düşük bulunmuştur. Bu amaçla sigara kullanan ve kullanmayan kişilerde Nesfatin-1 düzeylerini değerlendirmek için bu çalışma planlanmıştır.

Verilerin istatistiksel analizinde SPSS 23.0 programı kullanıldı. Elde edilen veriler t testi ile değerlendirildi ve yanılma düzeyi 0.05 olarak alındı. Araştırmaya sigara içen (n=35) ve sigara içmeyen (n=35) toplam 70 kişi dahil edildi. Katılımcıların cinsiyet, yaş, boy kilo, beden kitle indeksi ve nesfatin-1 düzeyleri ölçüldü ve karşılaştırıldı. Serum Nesfatin-1 düzeyleri sigara içenlerde (13,73± 3,11) sigara içmeyenlere (8,63 ± 0,91) göre önemli ölçüde daha yüksekti (t=-9,315, p<0,01). Sigara içen ve içmeyen grupta diğer parametreler arasında önemli bir fark bulunmamıştır.

Sigara içen kişilerde sigara içmeyenlere göre serum Nesfatin -1 değerleri yüksektir. Bu Nesfatin-1 ve sigara arasındaki ilişkiyi göstermektedir. Sigaranın hangi mekanizma ile nesfatin-1 seviyesinde artmaya neden olduğunu açıklayabilmek için daha ileri araştırmalara gerek olmakla birlikte obezite tedavisinde nesfatin-1 uygulaması yapılabilir.

**Anahtar sözcükler:** Sigara, Nesfatin, Beslenme

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## Introduction

Adipose tissue serves as both a fat storage and an endocrine organ, secreting various substances. Adipocytokines, or cytokines secreted within fat tissue, are divided into two types. Adiponectin is believed to have an anti-inflammatory effect, while adipocytokines like tumor necrosis factor alpha (TNF  $\alpha$ ), interleukin (IL)-6, monocyte chemoattractant protein 1 plasminogen activator inhibitor-1 have an inflammatory effect. Both types of adipocytokines need to be balanced in the body to prevent the development of diseases such as obesity, hypertension, diabetes-related vascular complications, and atherosclerosis. While recently discovered adipocytokines like omentin, visfatin, nesfatin, vaspin, and chemerin are not yet fully understood, nesfatin-1 is thought to have a contractile effect on vascular structures and could impact blood pressure<sup>1</sup>.

Nesfatin-1 is a novel adipocytokine with anorexogenic properties that modulates food intake and is linked to body mass index. While several cytokines, including TNF alpha, are involved in atherosclerosis and systemic inflammation, the precise mechanisms by which nesfatin-1 exerts its effects remain insufficiently understood<sup>2</sup>. Interestingly, existing research suggests that nesfatin-1 may also contribute to the inflammatory response<sup>3,4</sup>.

Similar to conditions such as Type 2 Diabetes Mellitus, obesity, insulin resistance, hypertension, and metabolic syndrome, smoking is a significant risk factor for atherosclerosis and systemic inflammation. A comprehensive understanding of nesfatin-1's role in metabolic diseases, insulin resistance, and inflammation could potentially aid in treating various ailments, particularly cardiovascular, neurovascular diseases, and it can be used as biomarker<sup>3-5</sup>.

Currently, there is a lack of sufficient research regarding the evaluation of nesfatin-1 levels in smokers and non-smokers. Our study aims to assess nesfatin-1 levels in both smokers and non-smokers.

## Materials and Methods

This study was conducted at Cumhuriyet University Faculty of Medicine Research and Practice Hospital and involved a volunteer patient group. The patients had a history of smoking for at least one year and were not discriminated against based on age or gender. We also included a control group of healthy, non-smoking volunteers. To ensure the study's validity, we excluded patients with previous

chronic diseases or current active infections. Hemogram and CRP results were obtained through routine examinations, and Nesfatin-1 levels were studied in blood samples taken from a sufficient number of patients. We did not exclude any patients against their will, and the study was concluded once we reached our target number of 35 volunteer smokers and 35 healthy non-smoker control groups. Patient and control group information was accessed from patient files or created patient forms. Blood samples were taken from patients who had fasted overnight, and Nesfatin-1 levels were determined after centrifugation and storage at -80 °C. The researcher covered the expenses for Nesfatin-1.

Nesfatin-1 levels were analyzed at the Biochemistry Laboratory of Cumhuriyet University Faculty of Medicine Research and Application Hospital using commercial Elisa kits (Cat no: EK-067-52, lot no: 603894; Phoenix Pharmaceuticals, Belmont, CA, USA). The analysis was concluded upon reaching the target file scan. Statistical analysis of patient group data was performed using SPSS 23.0 software, and a t-test was used to evaluate the data. The significance level was set at 0.05

## Ethics Committee Approval

Prior to conducting the research, ethics committee approval was obtained from Cumhuriyet University Interventional Clinical Research Ethics Committee (decision number 2019-03/02). In this manner, individuals provided informed consent before their participation.

## Results

The findings indicate that serum nesfatin-1 levels were notably elevated in smoking patients ( $13.73 \pm 3.11$ ) when compared to the non-smoking control group ( $8.63 \pm 0.91$ ) ( $t=-9.315$ ,  $p<0.01$ ). However, there were no significant differences observed in other parameters between the smoker and non-smoker groups, as presented in Table 1.

Grup	Smokers (n=35) (X±SD)	Non-smokers (n=35) (X±SD)	Test Result
Nesfatin-1	13,73 ±3,11	8,63±0,91	t=-9,315, p<0,01
Age	37,37±12,23	35,49±11,42	t=-0,667, p>0,05
Height	171,63±7,27	171,49±8,52	t=-0,075, p>0,05
Weight	73,23±12,78	73,49±10,59	t=0,092, p>0,05
BMI	25,48±3,50	25,50±3,28	t=0,028, p>0,05

## Discussion

While there has been some research on the impact of smoking on nesfatin-1, the available data is limited. Nesfatin-1 is a promising therapeutic agent for various diseases, but its potential role in addressing the obesity epidemic is particularly interesting. Obesity is a major health concern both domestically and globally, and understanding the biochemical mechanisms that influence our eating behaviors is critical. One such mechanism is nesfatin-1, a peptide that suppresses appetite[6]. Interestingly, nicotine, the primary metabolic component of smoking, has also been shown to suppress appetite, potentially suggesting a link between the two<sup>7,8</sup>.

Numerous studies have explored the correlation between nesfatin-1 levels and various biochemical parameters. Early research indicated that adipokines have a regulatory effect on energy metabolism and may be linked to obesity-related metabolic disorders as well as inflammatory diseases<sup>9,10</sup>. Additionally, adipokines have been linked to inflammatory lung conditions<sup>11</sup>, with most studies focusing on the role of leptin and adiponectin in these diseases. Some studies have shown that asthma can be predicted independently of obesity by high leptin and low adiponectin, while low leptin and high adiponectin are associated with stable COPD<sup>12</sup>. However, there are still conflicting results regarding the relationship between COPD and adipokines, and certain adipokines linked to chronic inflammatory diseases have not yet been studied<sup>13</sup>. One particular study found that serum nesfatin-1 levels were significantly lower in patients with obstructive sleep apnea syndrome (OSAS) than in healthy controls and that intravenous administration of nesfatin-1 to rats increased blood pressure and eliminated the decreases in blood pressure caused by sodium nitroprusside<sup>14</sup>.

Furthermore, Zhao et al. reported that plasma nesfatin-1 levels were significantly higher in hypertensive patients. Studies conducted on control groups, significantly overweight/obese hypertensive patients, indicate that nesfatin-1 plays a role in gonadal development, as it increases during the pubertal transition period and premature thelarche<sup>15</sup>. Finally, Park et al. found that while smoking reduced plasma testosterone levels and caused a decrease in sexual function, it did not significantly decrease estrogen levels in women<sup>16</sup>.

Although the role of nesfatin-1 in obesity is not yet fully understood, it is believed to interact with other molecules that regulate appetite, particularly leptin or melanocortin. Research has shown that nesfatin-1 is secreted from neurons in the brain regions that control energy balance. This appetite-regulating effect is independent of many transmitter systems but is related to the melanocortin system<sup>17</sup>.

Several studies have explored the relationship between nesfatin-1 levels and BMI. For example, a study by Abacı et al.(2013) found that serum nesfatin-1 levels were significantly lower in obese children than in the control group. Ramanjaneya et al.'s (2010) study of adults showed a positive correlation between plasma nesfatin-1 levels and BMI. However, this study did not find a significant statistical difference between BMI and nesfatin-1 levels.

## Conclusion

Nesfatin-1 has shown promise as a valuable target for developing non-toxic drug therapies to aid in the treatment of obesity and preventing weight gain after smoking cessation. Further comprehensive studies are needed to explore its effectiveness in controlling the increase in appetite that occurs after quitting smoking and other similar habits, as well as investigating all of its metabolic and endocrine

effects. With continued research, nesfatin-1 may prove to be a helpful tool in the fight against human obesity.

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