SHORT COMMUNICATION

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# A cross-sectional study on the Nesfatin-1 serum levels of Vietnamese patients with pre-diabetes

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Over the past few years, the number of diabetes patients in the world has increased rapidly, with many serious complications, making it one of the most pressing concerns in society. According to the International Diabetes Federation (IDF), there were 537 million people worldwide (aged 20–79) suffering from diabetes in 2021. This number is expected to rise to 783 million in 2045[1]. Vietnam is among the top 10 countries with the highest increase rate of diabetes cases, at 5.5% per year. As reported by the Vietnamese Association of Diabetes and Endocrinology (VADE), there are currently 5 million Vietnamese people living with diabetes, accounting for 6% of the population. This number is predicted to increase to 7 or 8 million by 2025[2]. Diabetes is estimated to be the cause of death for at least 80 people each day. The percentage of undiagnosed diabetes cases in Vietnam is nearly 62.6%[3]. If left undetected and untreated in the early stages, pre-diabetes can increase the risk of dangerous complications and severely affect the patient's health.

In recent years, Nesfatin-1 has been identified as one of the cytokines associated with diabetes[4,5]. Peripheral Nesfatin-1 was linked to several clinical laboratory parameters that influenced nutrition and metabolism[6]. Therefore, determining the concentration of Nesfatin-1 serum is important for assessing the disease progression, predicting the damage to target organs, and evaluating the impact of treatment measures.

A cross-sectional study was carried out on 524 patients diagnosed with prediabetes and 205 healthy people serving as the control group. These participants were taken from periodic health check-up groups at general hospitals in northern Vietnam. Pre-diabetes was diagnosed for those with fasting blood glucose (FBG) ≥126 mg/dL, hemoglobin A1c (HbA1c) ≥6.5%, or with classic symptoms of hyperglycemia[7]. The concentration of Nesfatin-1 serum, anthropometry, and clinical parameters associated with the cardiovascular, hepatic, and renal organs were determined and analyzed.

Nesfatin-1 has the effects of suppressing appetite, reducing gastric motility, reducing cholesterol, triglycerides, and white adipose mass, as well as lowering lipid production and glucose in the blood. The Nesfatin-1 serum level of pre-diabetes patients was 1.5 times lower than in the control group (0.66 vs. 1.12 ng/mL) (Table 1). Blood glucose-related indices of pre-diabetes, such as HbA1c and

**Table 1.** Demographic, anthropometric, and metabolic characteristics of pre-diabetes.

| Group | Control | Patients |
|---|---|---|
| Numbers (male/ female) | 205 (100/105) | 524 (272/252) |
| Age (years) | 52.02±17.89 | 52.21±18.18 |
| Duration time (years) | – | 1.98±0.73 |
| Body mass index (kg/m$^2$) | 21.59±1.21 | 22.05±1.23 |
| Waist hip ratio | 0.90±0.11 | 0.86±0.10 |
| Hemoglobin A1c (%) | 5.40±0.65 | 6.41±1.35 |
| Fasting blood glucose (mmol/L) | 5.65±0.78 | 7.76±1.71 |
| Total cholesterol (mmol/L) | 4.84±1.01 | 6.02±1.11 |
| Triglycerides (mmol/L) | 1.71±0.77 | 2.72±1.59 |
| High-density lipoprotein cholesterol (mmol/L) | 1.41±0.38 | 1.30±0.47 |
| Low-density lipoprotein cholesterol (mmol/L) | 2.65±0.72 | 2.88±1.18 |
| Alanine aminotransferase (UI/L) | 29.97±3.54 | 38.09±4.64 |
| Aspartate aminotransferase (UI/L) | 26.77±2.81 | 37.34±6.36 |
| Creatinine serum (umol/L) | 88.92±9.42 | 108.12±12.87 |
| Creatinine urine (umol/L) | 107.89±8.83 | 118.01±7.24 |
| Nesfatin-1 serum (ng/mL) | 1.12±0.38 | 0.66±0.37 |

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FBG, were also higher than in the control group (6.41% and 7.76 mmol/L vs. 5.52% and 4.83 mmol/L). The parameters associated with cardiovascular disease in the pre-diabetes group were also significantly elevated, such as total cholesterol (6.02 mmol/L) and triglycerides (9.72 mmol/L). The data relating to cholesterol density, high-density lipoprotein cholesterol (HDL-C), and low-density lipoprotein cholesterol (LDL-C) varied between study groups. Although they did not reach the warning or prudent level (HDL-C<1.0 mmol/L and LDL-C>3.3 mmol/L), they were still worse compared to the control group. Therefore, special monitoring and early treatment are essential.

The results of liver and kidney tests showed that the condition of the liver was heading in a bad direction, as indicated by the alanine aminotransferase (ALT) and aspartate aminotransferase (AST) values (38.09 and 37.34 UI/L, respectively). Additionally, the creatinine serum and creatinine urine results for the pre-diabetes group were also not positive (108.12 and 118.01 µmol/L, respectively).

The study aimed to evaluate the correlation between Nesfatin-1 serum levels and the test parameters in pre-diabetes patients (Table 2). The results indicated that these values were lower in Vietnamese pre-diabetes patients compared to other Asian patients but higher than those in Europeans[8-10]. Furthermore, there was a positive correlation between the Nesfatin-1 serum levels and ALT, AST, and creatinine (r=0.113, p=0.009; r=0.133, p=0.002; and r=0.091, r=0.094, p<0.05). Conversely, a negative correlation was observed between Nesfatin-1 serum levels and body mass index (BMI), HbA1c, cholesterol, and triglycerides (p<0.05). Some previous studies have reported similar correlations but without statistically significant results (p>0.05)[10-12]. The variability in sample size, patient selection, experimental methods, and ethnographic factors may explain these differing results.

This study represents the first published on Nesfatin-1 serum levels in Vietnamese pre-diabetes patients and reveals differences in concentration compared to other countries worldwide. The correlation between Nesfatin-1 serum concentration and clinical parameters associated with cardiovascular, liver, and kidney conditions was recorded for the first time in Vietnamese pre-diabetic patients, with statistically significant correlations observed between Nesfatin-1 serum levels and creatinine, aminotransferase, triglycerides, lipoprotein, cholesterol, hemoglobin A1c, and BMI.

**Table 2.** The correlation analysis results between Nesfatin-1 serum levels and diabetes.

| Parameters | Pre-diabetes | |
|---|---|---|
| | r | p-value |
| Age | -0.064 | 0.143 |
| Body mass index | -0.105 | 0.015 |
| Waist hip ratio | -0.037 | 0.394 |
| Hemoglobin A1c | -0.108 | 0.014 |
| Fasting blood glucose | 0.040 | 0.365 |
| Total cholesterol | -0.117 | 0.007 |
| Triglycerides | -0.102 | 0.020 |
| High-density lipoprotein cholesterol | 0.094 | 0.031 |
| Low-density lipoprotein cholesterol | -0.132 | 0.002 |
| Alanine aminotransferase | 0.113 | 0.009 |
| Aspartate aminotransferase | 0.133 | 0.002 |
| Creatinine serum | 0.091 | 0.037 |
| Creatinine urine | 0.094 | 0.032 |

## AUTHORS' CONTRIBUTIONS

**NMD:** Formal Analysis, Validation, Visualization, Writing – original draft, Writing – review & editing. **MNN:** Conceptualization, Supervision, Review & editing. **TTBV:** Formal Analysis. **MTN:** Data curation. **STD:** Data curation.

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