Association of nitrite concentration in biological fluids with lifestyle and blood bichemical parameters

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Introduction

Recent discoveries indicate important role of nitrite in NOS-independent production of the nitric oxide. Study of nitrite production in human biological fluids is important for understanding of above process in pathologies. Multiple sclerosis (MS) is a lifelong demyelinating disease, an autoimmune disorder, characterized by NO overproduction.

a
1. Ingestion of dietary nitrate
2. Concentration of nitrate in the salivary gland
3. Nitrate is absorbed from the stomach and small intestine
4. Nitrate excreted by the kidneys

b
5. Lingual bacteria reduce nitrate to nitrite *
6. The acidic conditions of the stomach reduce nitrite to NO.
7. NO and nitrite diffuse into portal circulation; NO is oxidized to nitrite.
8. Nitrite is transported in arterial circulation
9. Nitrite reduced to NO in resistance vessels causing vasodilatation and lowering of blood pressure

Materials and methods

Samples of human blood serum, saliva and urine collected in Latvian residents without MS were used for nitrite detection on the *Sievers'* nitric oxide analyser (NOA) (Model 280i). Data were compared to lifestyle habits, clinical and biochemical parameters.
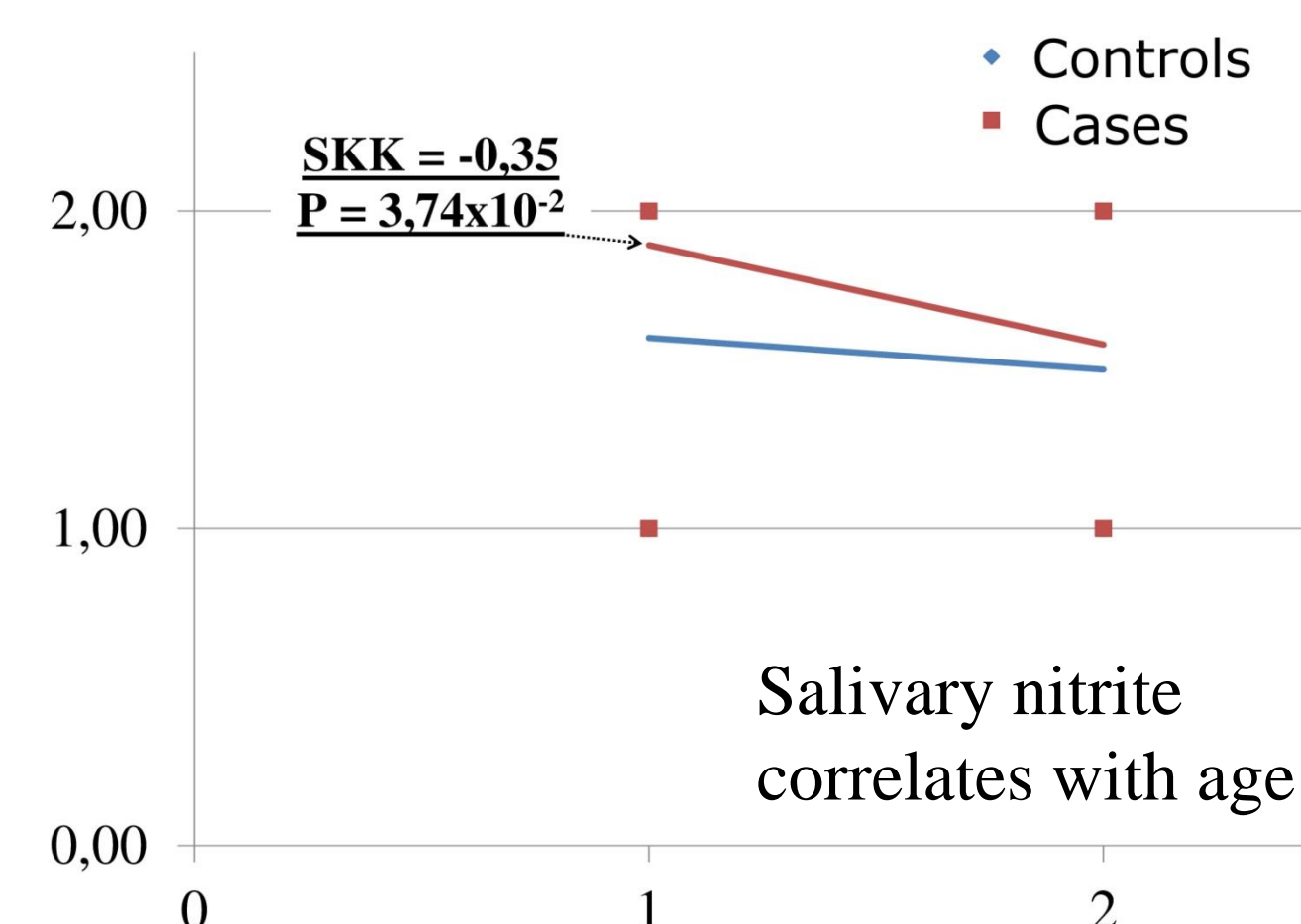
Results

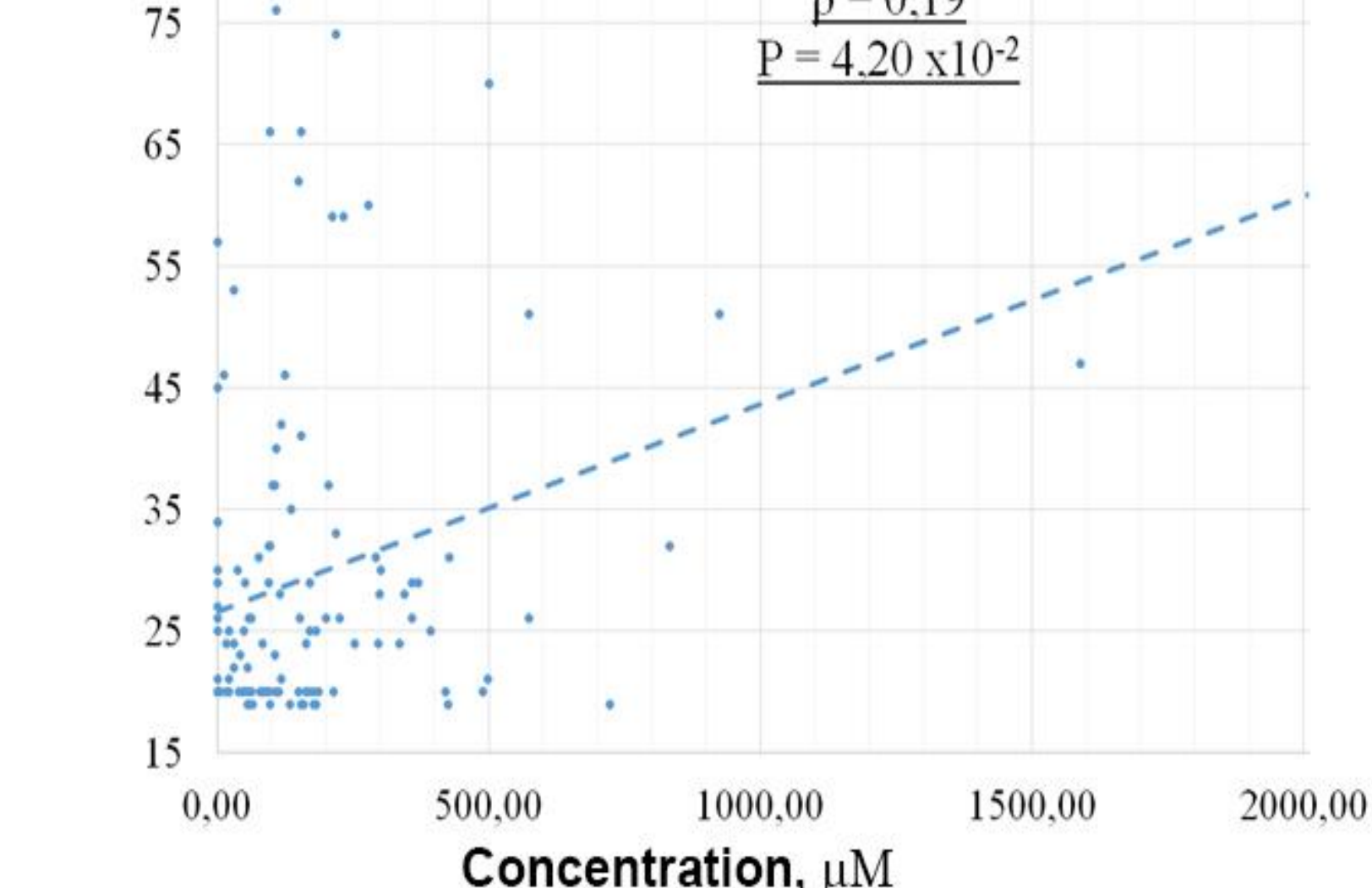**NO level in blood (ng/g tissue), blue-controls; red -T1DM**

$P = 8,71 \times 10^{-9}$
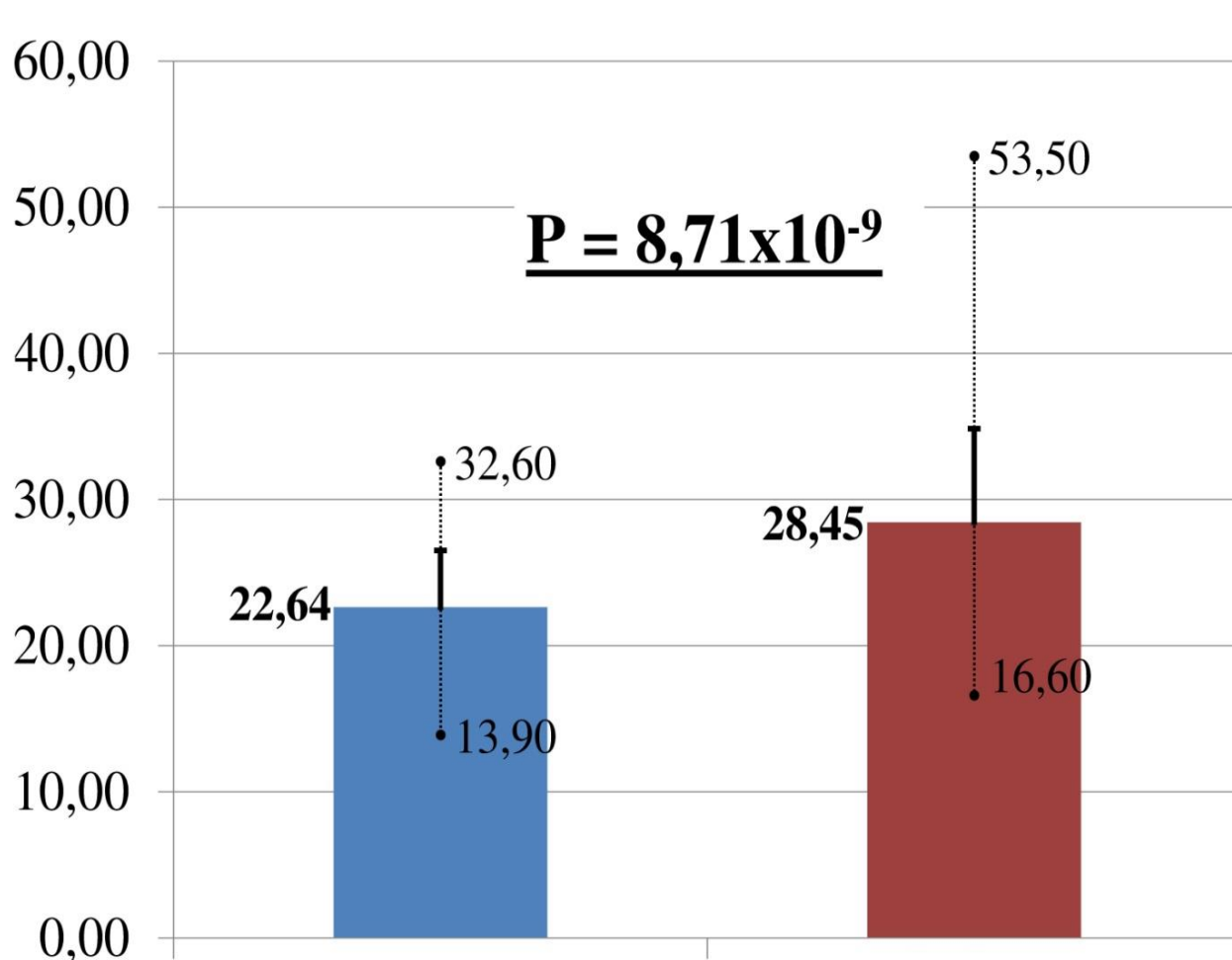
log $[NO_2^-/NO_3^-]$ in serum and urine

$P = 3,46 \times 10^{-2}$
$P = 6,56 \times 10^{-3}$
Controls / Cases
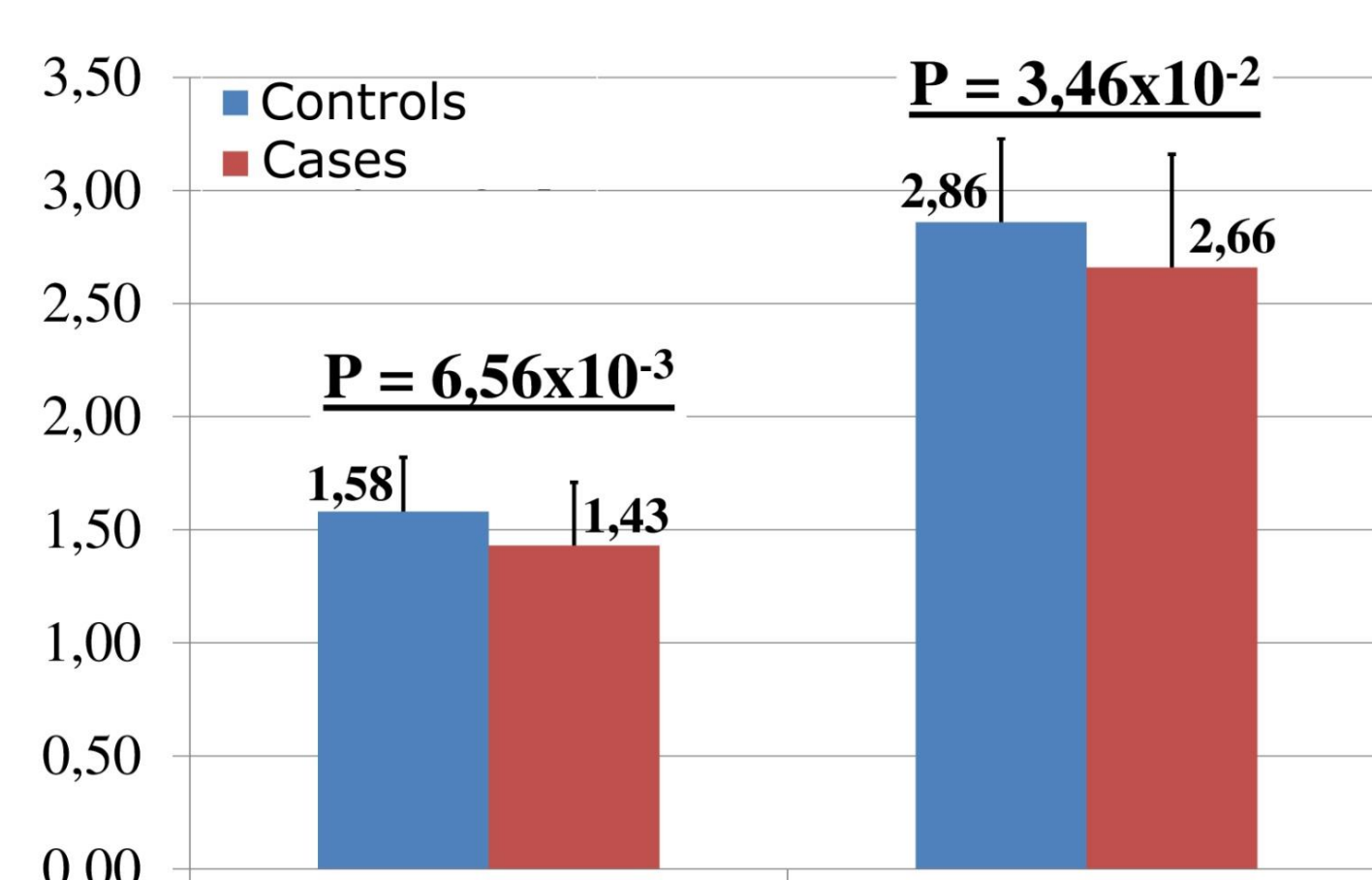
Correlation between NO level in blood (ordinate) and NO_2^-/NO_3^- (abscissa) level in serum

SKK = -0,35
$P = 3,74 \times 10^{-2}$
Controls / Cases
Salivary nitrite correlates with age

Correlation between age and nitrite concentration (µM) in saliva

ρ = 0,19
$P = 4.20 \times 10^{-2}$

Median added serum NO2/NO3 conc. umol/L
smokers   quitters   non-smokers

Correlation between frequency of alcohol consumption and nitrite concentration (µM) in saliva

η = 0,42
Salivary nitrite correlates with alcohol consumption
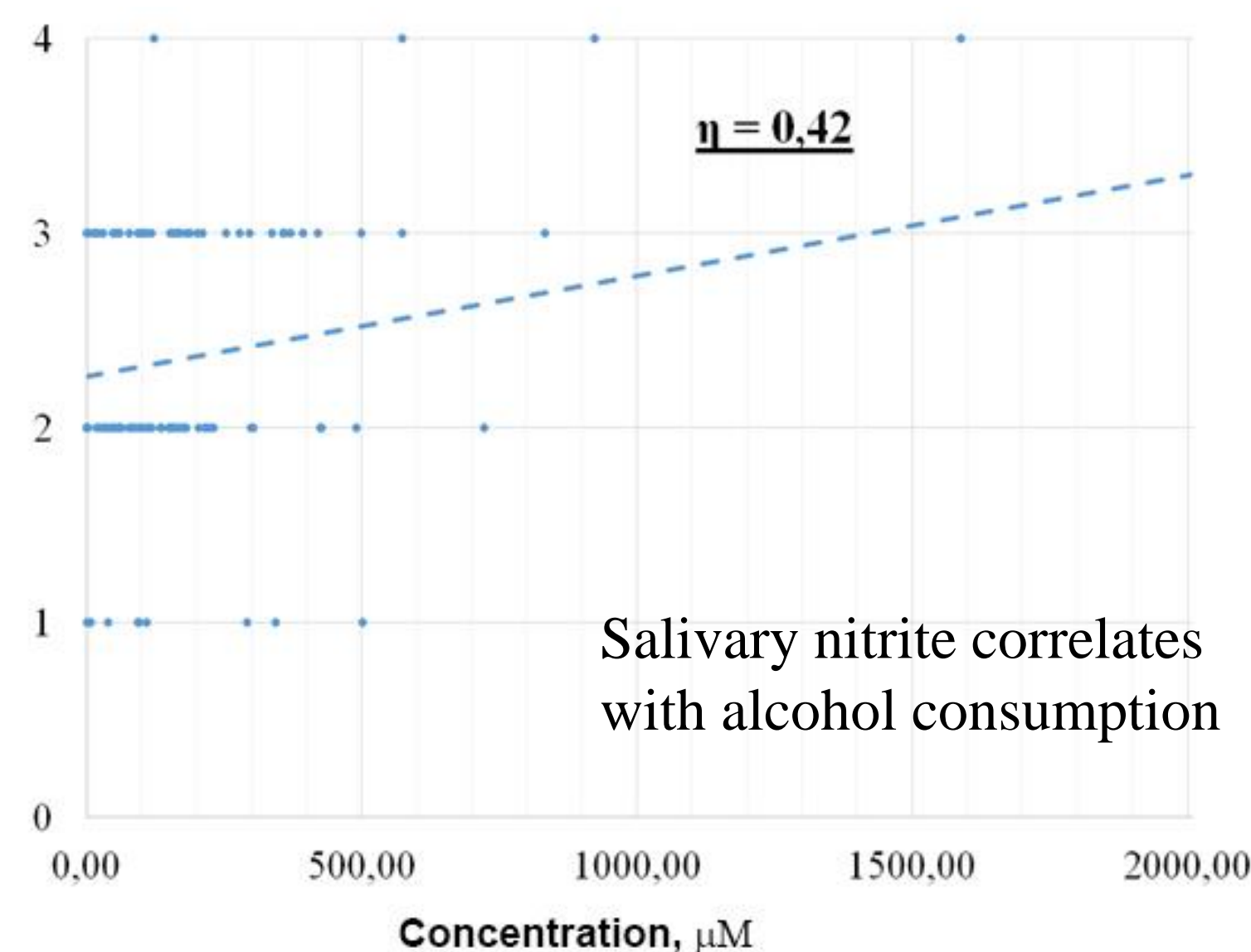
Association between concentration (µM) and frequency of alcohol consumption

Number of participants   Mean concentration ± SD
$P = 4,78 \times 10^{-2}$
η = 0,42
749,20
7,83 / 95,17   51,30 / 308,31   37,39 / 118,01   3,48
Never   Rare   Often   Very often
Alcohol consumption

Median salivary nitrite conc. umol/L
(p value =0,004)
Red bar = monthly exercise 68, 23±34,82
Blue bar = weekly exercise 178.63 ±368,24
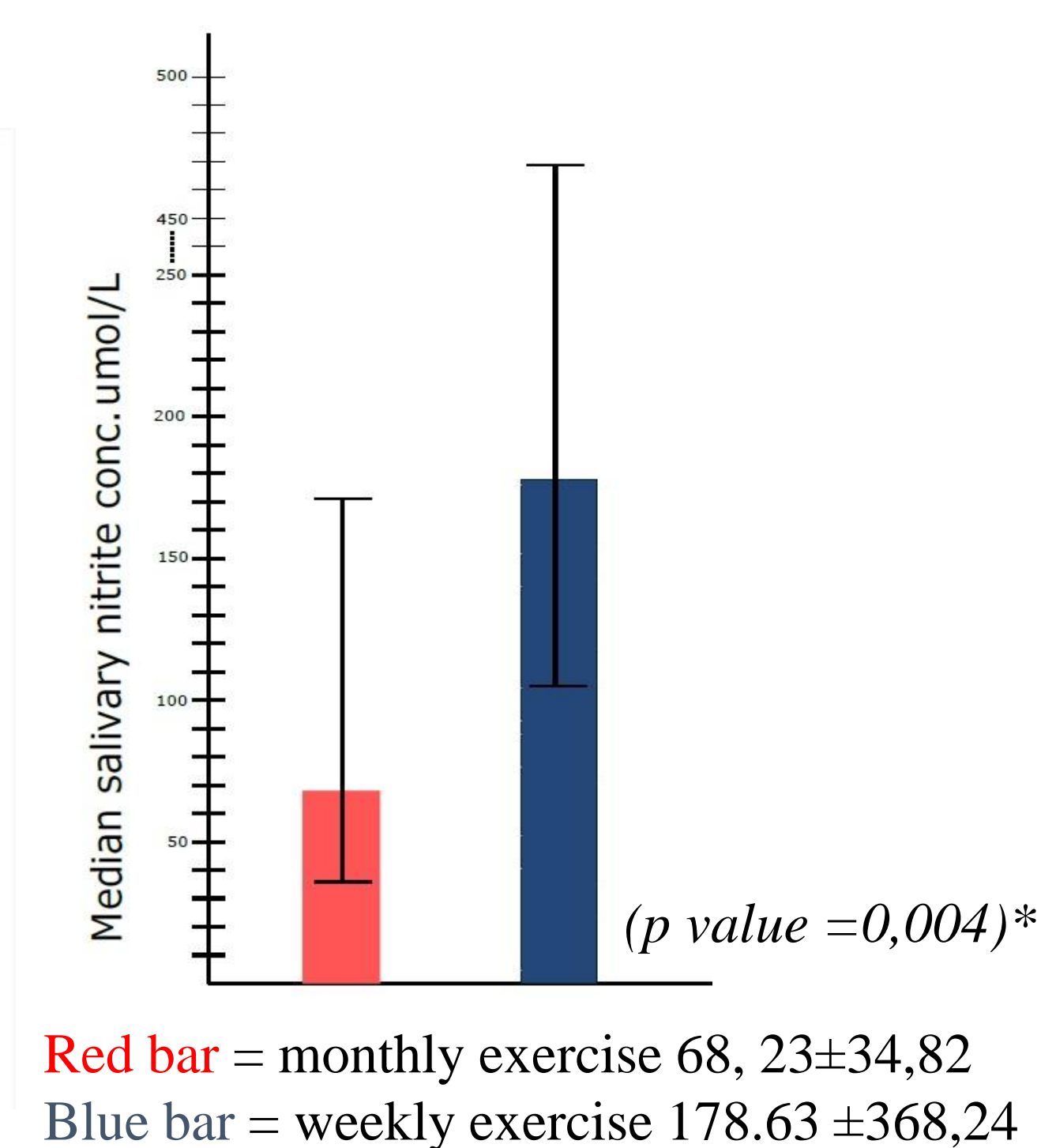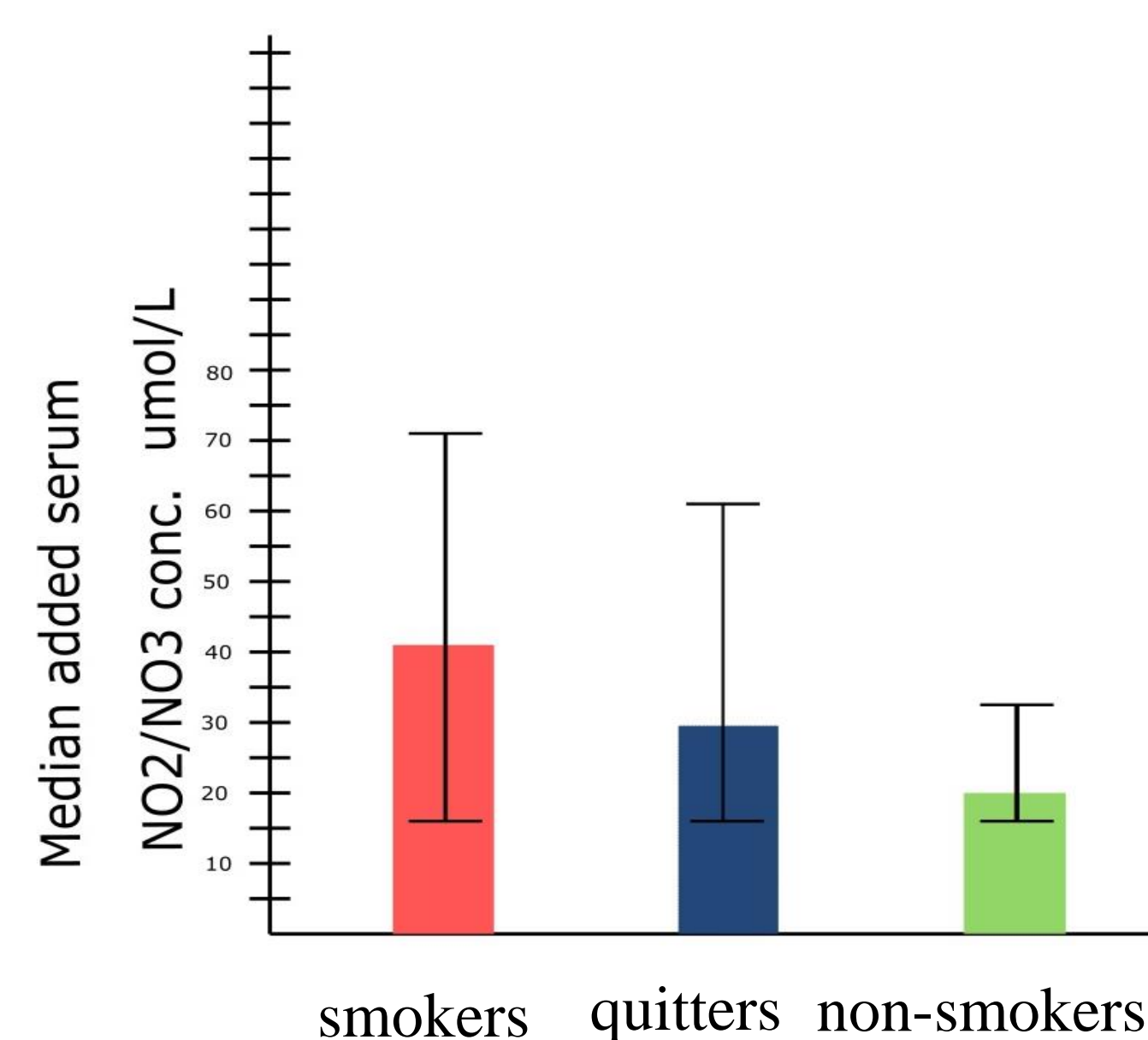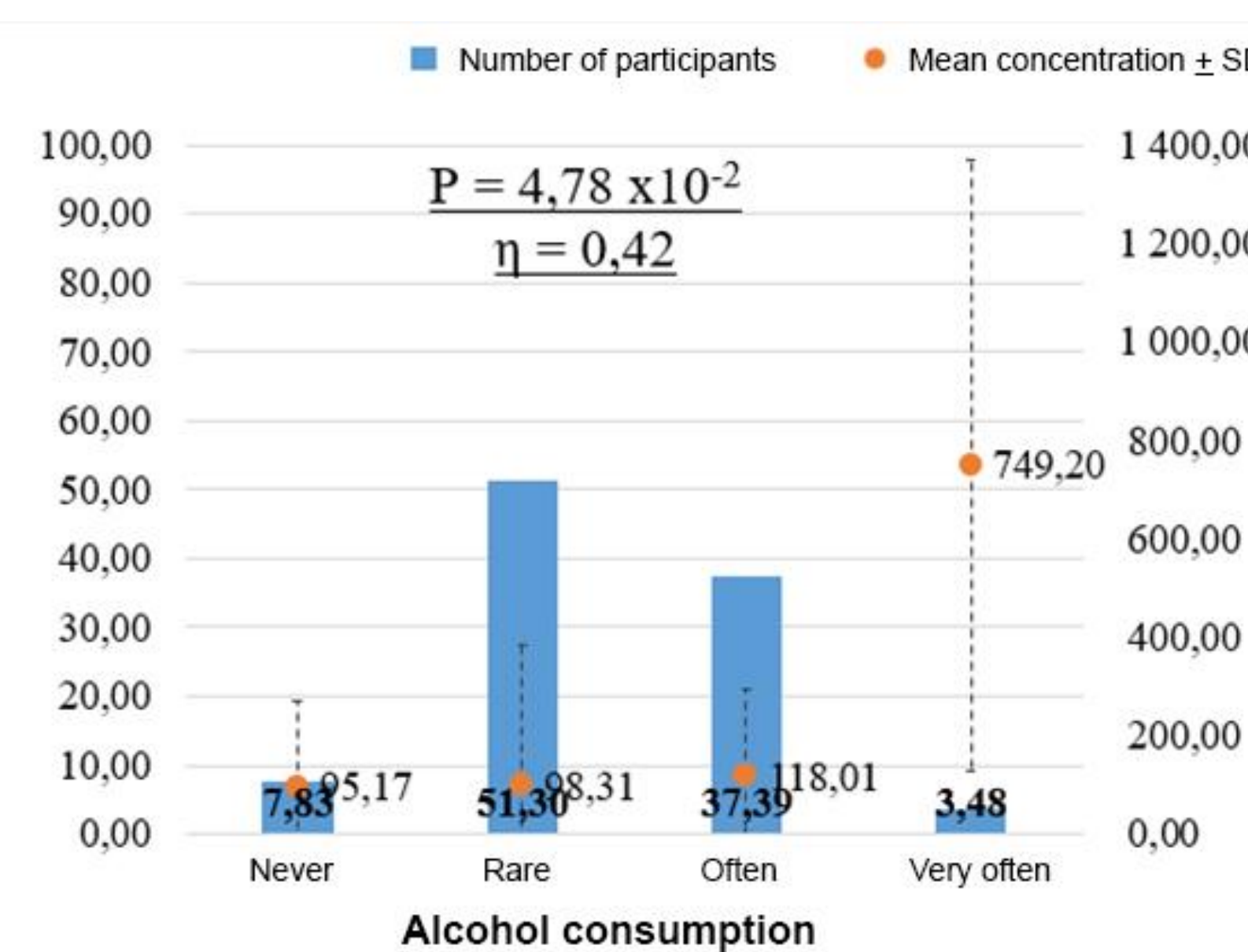
Conclusions

Taken together our data indicate that nitrite concentration in biological fluids is a sensitive test associated with several lifestyle and physiological parameters.
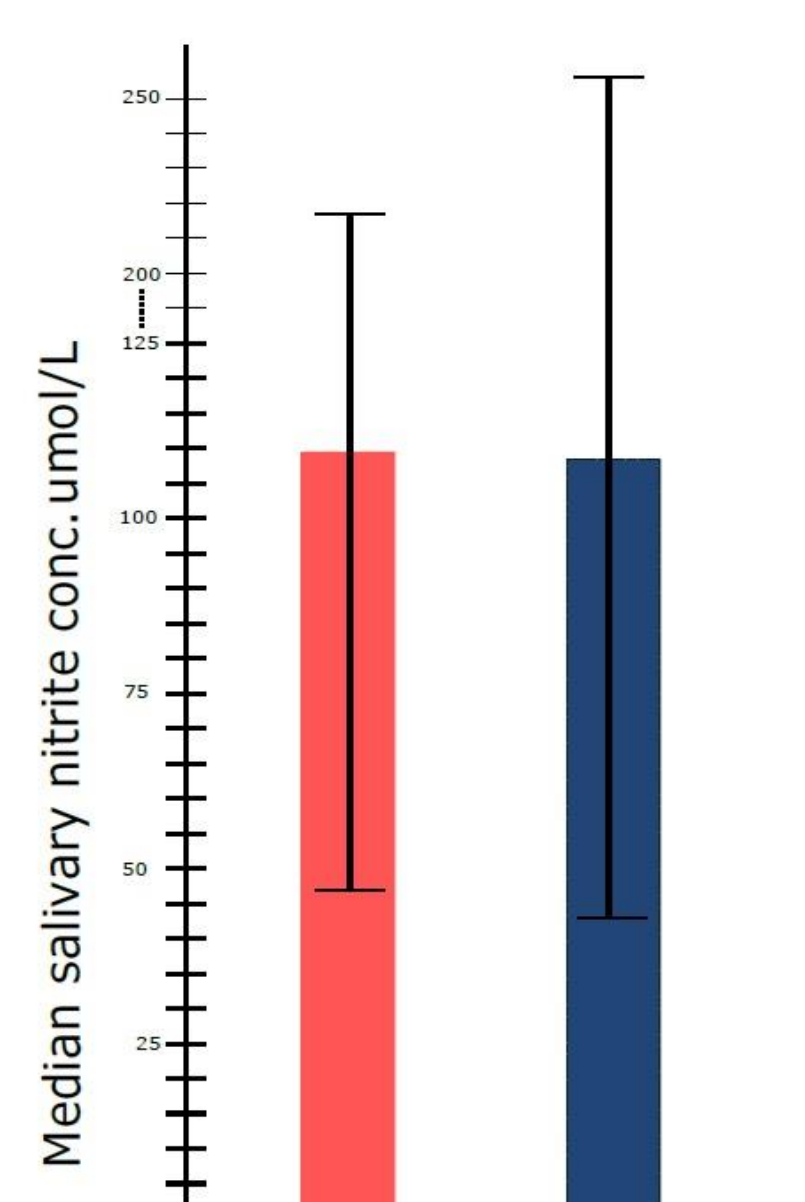
Median salivary nitrite concentration (µmol/L) (+IQR) of both groups

Red bar = T1DM-group: 108,81±213,32 µmol/L
Blue bar = control group: 109,00±168,76 µmol/L

T1DM with Hypertension = ↑ nitrite

(p value = 0,161)
Red bar = Hypertension 186,71±326,77
Blue bar = no Hypertension 108,36±199,38
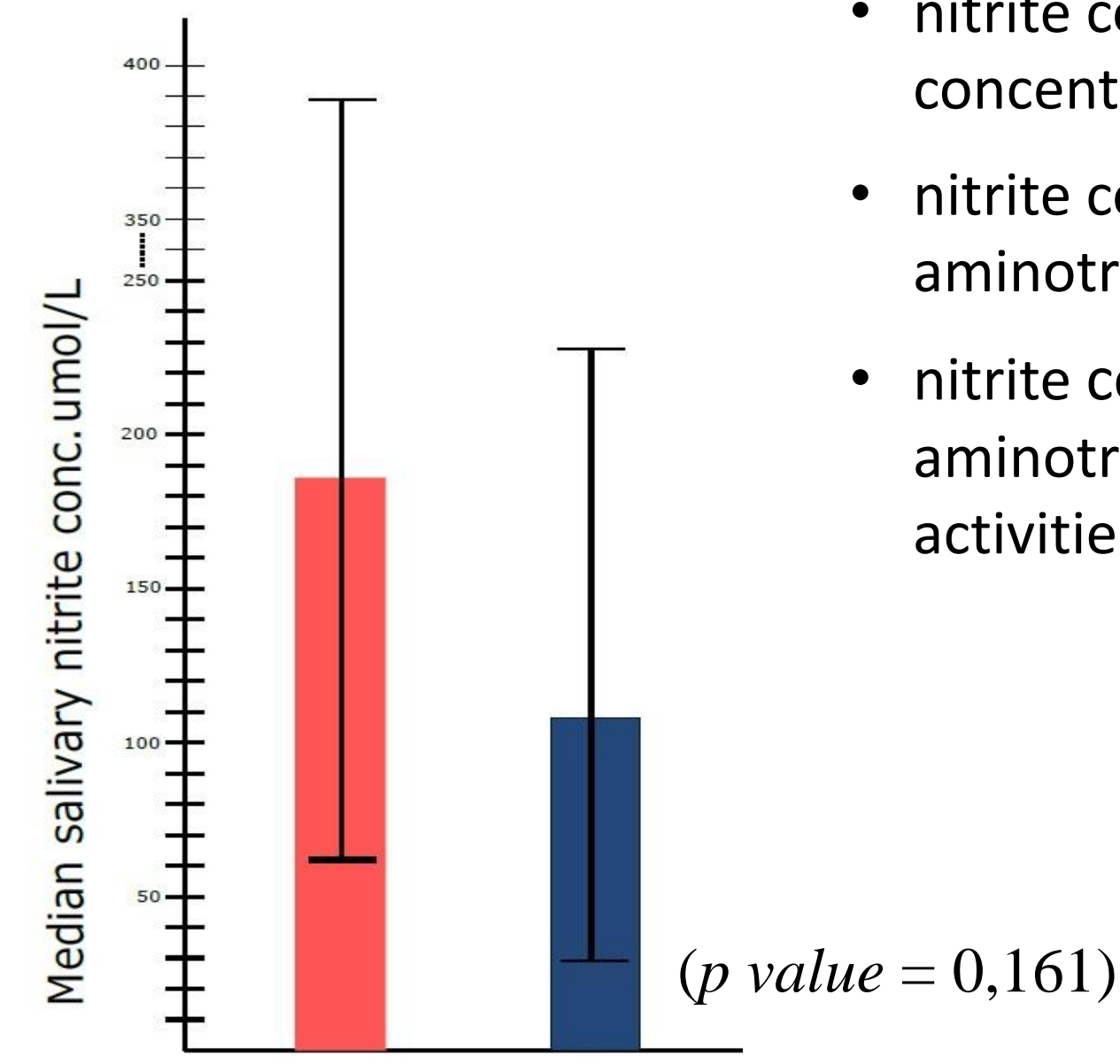
In T1DM patients a statistically significant negative correlation was found between:

- nitrite concentration in urine and triglyceride concentration (mmol/l) (p = 0,04, τ = - 0,10);
- nitrite concentration in urine and alanine aminotransferase (U/L) (p = 0,01, τ = - 0,12);
- nitrite concentration in urine and asparagine aminotransferase (U/L) (p = 0,04, τ = - 0,12) activities in blood.

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