



Combined Use of Phosphatidylethanol and the Audit Test for Detecting of Alcohol Abuse

Yury Evgeny Razvodovsky¹, Schuriberco Aleksey Vladimirovitz¹

¹State Enterprise "Institute of Biochemistry of Biologically Active Compounds of the National Academy of Sciences of Belarus", Grodno, Republic of Belarus

Key words

Phosphatidylethanol; AUDIT; surveys and questionnaires; prevalence; alcoholism; men

Abstract

Aim: To estimate the prevalence of alcohol abuse among men by using combined the direct biochemical marker phosphatidylethanol (PEth) and the AUDIT questionnaire (Alcohol Use Disorders Identification Test). **Subjects and Methods:** The concentration of PEth was determined in 136 blood samples of men aged 15 - 65 years. The blood was obtained from the laboratory of the medical advisory centre, where it was submitted for routine biochemical analysis. Immediately before blood sampling, clients were asked to complete the AUDIT questionnaire. Determination of the concentration of PEth was carried out using the method of high performance liquid chromatography - tandem mass spectrometry (HPLC - MS). Statistical data processing was carried out using the Statistica 10.0 program. **Results:** Discrimination by the level of alcohol consumption using the concentration of PEth showed that the proportion of abstinent (practically not drinking alcohol) among men was 20.6 %; the proportion of moderate drinkers was 63.1 %; the proportion of alcohol abusers was 16.3 %. The highest average concentration of PEth, as well as the proportion of those who abuse alcohol, was observed in the age groups of 50 - 59 and 60+ years. The distribution by level of alcohol con-

sumption according to the total score of the AUDIT test was as follows: abstinent - 17.9 %; moderate drinkers - 69.6 %; alcohol abusers - 12.5 %. The highest average test score, as well as the highest share of alcohol abusers, was observed in the age group 50 - 59 years. Correlation analysis did not reveal any relationship between the concentration of PEth in the blood and the total score of the AUDIT test in any of the age groups of men. **Conclusion:** The results indicate a fairly high prevalence of alcohol abuse among men. Alcohol-related problems are especially high among middle-aged men. The outcomes suggest a low concordance between the concentration of PEth in the blood and the AUDIT score.

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Introduction

Belarus suffers from a heavy burden of alcohol-related problems due to the high prevalence of alcohol abuse among men [1]. According to WHO, the prevalence of heavy episodic drinking among men is 40.5 %, while the prevalence of alcohol dependence is 19.6 % [2]. In this regard, the relevance of implementing effective preventive strategies is obvious, one of which is the early diagnosis of alcohol dependence [2]. Currently, for the screening of the alcohol-related problems prevalence, questionnaires are widely used, the advantages of which

Correspondence to:
Yury Evgeny Razvodovsky
State Enterprise "Institute of Biochemistry of Biologically Active Compounds of the National Academy of Sciences of Belarus"
St. A. Tysengauz 7, 230009 Grodno, Republic of Belarus
E-mail: razvodovsky@tut.by

are ease of use and fast results [3]. The “gold standard” of the questionnaire is the AUDIT test, developed by WHO experts to screen the prevalence of alcohol-related problems among people who seek help from primary care specialists [4]. A significant drawback of questionnaires is their low validity through the memory recall bias and underreporting of alcohol consumption [4]. To assess the reliability of questionnaires, a direct biochemical marker of alcohol abuse phosphatidylethanol (PEth) is often used [5]. PEth which is an abnormal glycerophospholipid formed in various tissues in the presence of ethanol [5]. The available evidence indicates that PEth is one of the most reliable biochemical markers of harmful drinking, since it has greater sensitivity and specificity [6]. The aim of this study was to estimate the prevalence of alcohol abuse among men through the combined use of PEth and the AUDIT test.

Subjects and Methods

The concentration of PEth was determined in 136 blood samples of men aged 15-65 years. The blood was obtained from the laboratory of the medical advisory centre, where it was submitted for routine biochemical analysis. Immediately prior to blood sampling, clients were asked to complete the AUDIT questionnaire. Determination of PEth concentration was carried out using the method of high performance liquid chromatography - tandem mass spectrometry (HPLC - MS) [7].

Statistical data processing (descriptive statistics, Spearman correlation analysis) was performed using the Statistica 10.0 program for Windows (StatSoft, Inc., USA). To test statistical hypotheses about the type of distribution, the Shapiro-Wilk test

was applied. The sample mean and sample standard deviation were used to describe the numerical values of the sample data under a normal distribution. Quantitative traits with asymmetric distribution were described using the median and percentiles.

Results

The average concentration of PEth in the blood was 136.4 ± 19.1 nmol/ml (the minimum concentration was 6.3 nmol/ml, the maximum concentration was 1238.8 nmol/ml); the median of the sample was 42.3 (- 23.2/ + 146.7) nmol/ml. Discrimination by the level of alcohol consumption using threshold concentrations of PEth showed that the proportion of abstinent was 20.6 %; the proportion of moderate drinkers was 63.1 %; the proportion of those who abuse alcohol was 16.3 %. The highest average concentration of PEth, as well as the proportion of those who abuse alcohol, was observed in the age groups of 50 - 59 and 60 + years. The highest median concentration of PEth was observed in the age groups of 30 - 39 and 40 - 49 years (Table 1).

According to the screening results, the mean AUDIT score was 3.8 ± 0.3 ; the median of the sample was 3.0 (1-6). The distribution by level of alcohol consumption according to the total score of the AUDIT test was as follows: abstinent - 17.9 %; moderate drinkers - 69.6 %; alcohol abusers - 12.5 %. The highest average test score, as well as the highest share of alcohol abusers, was observed in the age group 50 - 59 years (Table 2). Correlation analysis did not reveal any relationship between the concentration of PhE in the blood and the total score of the AUDIT test in any of the age groups of men.

Table 1. The mean and median concentration of PEth (nmol/mL) and classification of alcohol consumption level using concentrations of PEth

Indicators	Age					
	0 - 17	18 - 29	30 - 39	40 - 49	50 - 59	60 +
PEth M \pm m	22.5 \pm 7.5	92.5 \pm 34.5	107.4 \pm 21.4	92.9 \pm 16.8	147.9 \pm 45.4	162.6 \pm 75.1
PEth Me (Q25 - Q75)	20.6 (17.6 – 23.9)	30.5 (22.9 -103.1)	77.2 (35.3 – 146.7)	72.0 (26.1 – 138.4)	33.0 (23.9 – 171.5)	33.4 (25.7 – 52.6)
Abstinent %	60.0	0.0	9.1	9.1	20.0	23.5
Moderate consumers %	40.0	92.3	81.8	81.8	56.0	58.8
Alcohol abusers %	0.0	7.7	9.1	9.1	24.0	17.7

PEth - Phosphatidylethanol

Table 2. The mean and median AUDIT score and classification of alcohol consumption level using AUDIT.

Indicators	Age					
	0 - 17	18 - 29	30 - 39	40 - 49	50 - 59	60 +
AUDIT M \pm M	0	4.3 \pm 0.8	3.3 \pm 0.5	4.6 \pm 0.7	4.8 \pm 0.7	4.06 \pm 1.1
AUDIT Me (Q25 - Q75)	0	3.0 (5.0 - 6.0)	1.0 (2.5 - 5.0)	3.0 (3.0 - 6.0)	2.0 (4.0 - 7.0)	1.0 (3.0 - 5.0)
Abstinent %	100	15.4	9.1	0.0	4.0	23.5
Moderate consumers %	0.0	69.2	77.3	81.8	68.0	58.8
Alcohol abusers %	0.0	15.4	13.6	18.2	28.0	17.7

Discussion

There is evidence, that age is an important predictor of alcohol-related problems [8]. The results of cross-sectional studies indicate the regional specificity of age-specific variability in the prevalence of alcohol abuse [8]. In Western European countries, the frequency of alcohol consumption among men increases monotonously with increasing age, while the prevalence of episodic binge drinking decreases with age [2]. In the former Soviet republics, the highest level of alcohol-related problems is found among men in the 40 - 59 age group [8].

The results of a screening study previously conducted in Belarus showed that the highest level of alcohol-related problems is observed among men aged 40 - 49 years [1]. The age distribution of morbidity with alcoholic psychoses among men is unimodal: it gradually increases with increasing age, reaching a peak in the age group of 40 - 49 years, after which it decreases [1]. The highest mortality rate as a result of acute alcohol poisoning is observed at the age of 35 - 59 years [1].

The results of the estimation using PEth, as well as the estimation using the AUDIT test, showed that the highest prevalence of alcohol abuse was observed among men of the age group 50 - 59 years. The high level of alcohol-related problems among middle-aged men requires targeted prevention measures within the framework of the state alcohol policy. The data obtained are consistent with the results of studies conducted in Russia, which showed a low concordance between the concentration of PEth in the blood and self-reported alcohol consumption [9,10].

Before concluding, several potential limitations of this study must be mentioned. In particular, the share of abstinent is most likely overestimated due to the lack of a clear threshold for the concentration of PEth to discriminate between abstinent and moderate drinkers [6]. In addition, the validity of extrapolating the results of this study to the general population should be discussed. The relatively low prevalence of alcohol abuse compared with the results of previous studies [9,10] can to some extent be explained by the specifics of the participants of this study. Apparently, most of the clients of the medical advisory centre limited their alcohol consumption. Therefore, the data obtained should be extrapolated to the general population with caution.

In conclusion, the results of this study indicate a fairly high prevalence of alcohol abuse among men. Alcohol-related problems are especially high among middle-aged men. The outcomes suggest a low concordance between the concentration of PEth in the blood and the AUDIT score. The use of biochemical markers is a good way to objectify the diagnostics of harmful drinking.

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Conflict of Interest

None to declare.

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