Assessment of *trans* fatty acids content in food from Romanian market

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BACKGROUND

Trans fatty acids are chemically "monounsaturated" or "polyunsaturated". They are considered so different from the *cis* monounsaturated or polyunsaturated fatty acids that they can't be legally designated as unsaturated for purposes of labelling. Gas chromatography (GC) represent method most commonly used to identify and quantify *trans* fatty acids. The law in Romania (No. 182/2020) requires that *trans* fats content is included in labelling of food and not exceed 2g/100g of fat. The quantitation and identification of *trans* fatty acid isomers by GC is difficult because of the wide range of fatty acid isomers present in complex food samples. Accurate information on the content of *trans* fat in foods can come from proper techniques for extracting lipids, saponification, and methylation of fatty acids. The GC-FID technique was used for detection, separation, identification and quantification of *trans* fatty acid in food. Lipids were extracted from the food and fatty acids converted into methyl esters and analysed by GC.
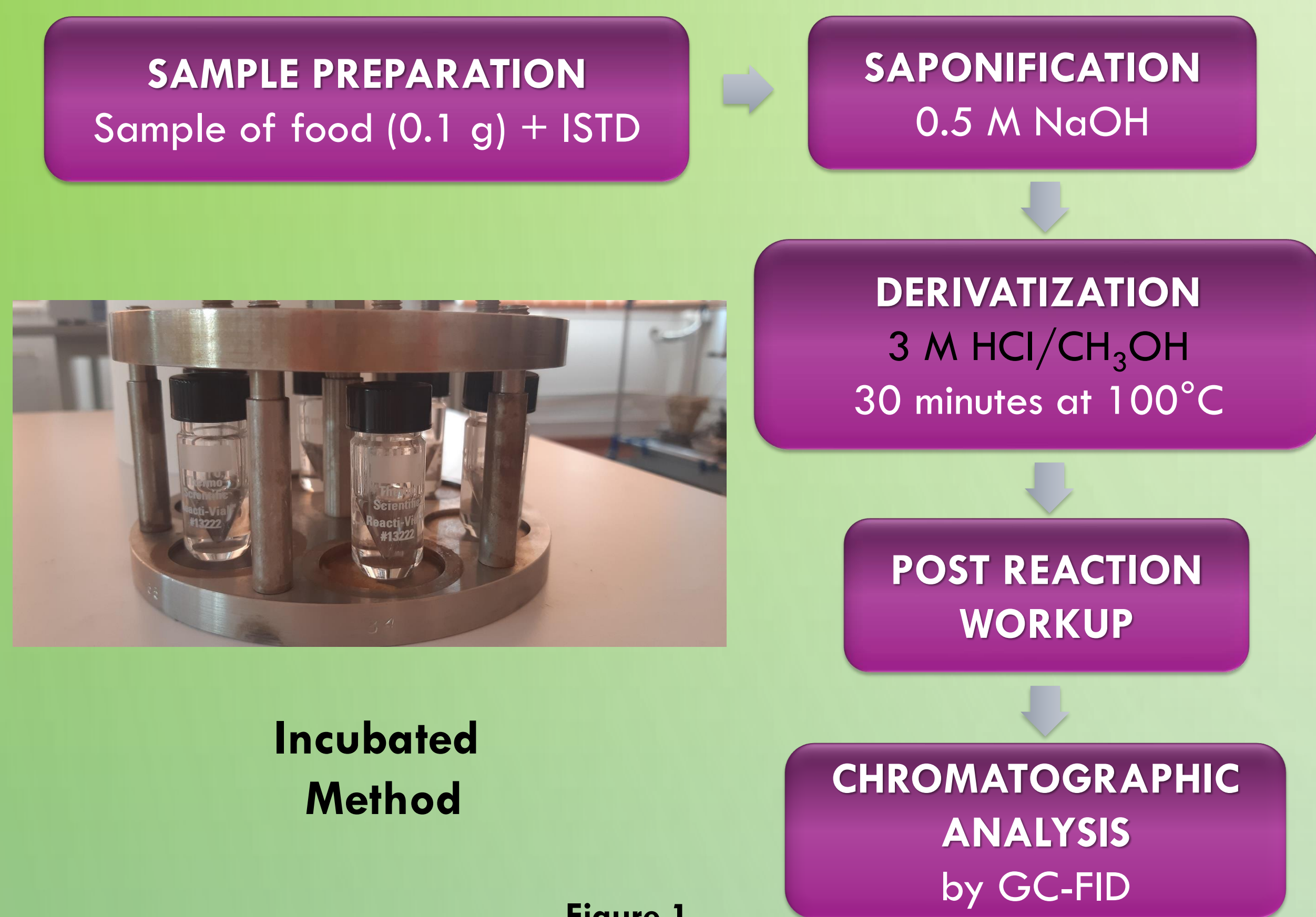
MATERIALS AND METHODS

SAMPLE PREPARATION
Sample of food (0.1 g) + ISTD

SAPONIFICATION
0.5 M NaOH

DERIVATIZATION
3 M HCl/CH$_3$OH
30 minutes at 100°C

POST REACTION WORKUP

CHROMATOGRAPHIC ANALYSIS
by GC-FID

Incubated Method

Figure 1
Scheme depicting the sequence of fatty acid sample preparation prior to analysis

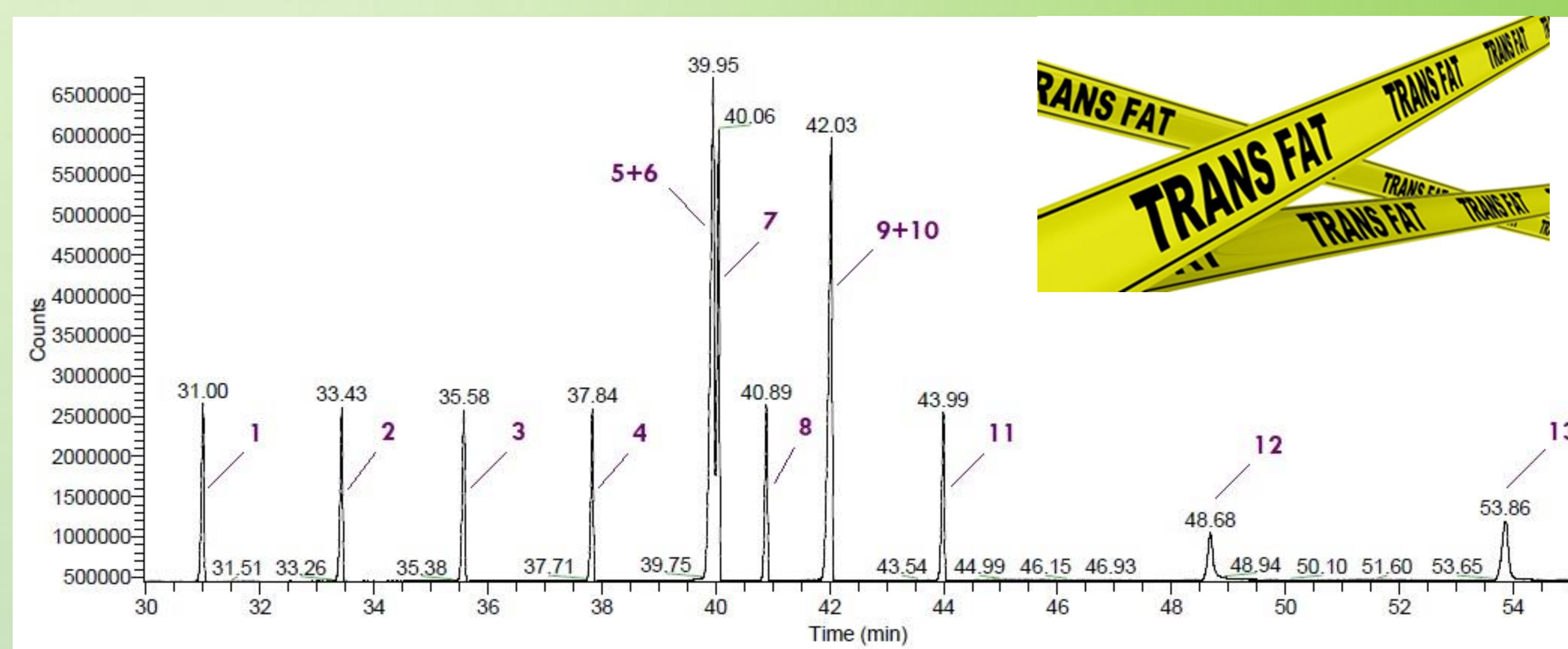## RESULTS AND DISCUSION

Figure 2
GC-FID chromatogram of the separation of the mixtures standard of *trans* fatty acids

Peak List:
1). C14:1 *trans* – Methyl Myristelaidate
2). C15:1 *trans* - Methyl 10-Transpentadecenoate
3). C16:1 *trans* – Methyl Palmitelaidate
4). C17:1 *trans* – Methyl 10-Transheptadecenoate
5). C18:1 *trans* – Methyl Petroselaidate
6). C18:1 *trans* – Methyl Elaidate
7). C18:2 *trans* – Methyl Transvaccenate
8). C18:2 *trans, trans* – Methyl Linoelaidate
9). C19:1 *trans* – Methyl 7-Transnonadecenoate
10). C19:1 *trans* – Methyl 10-Transnonadecenoate
11). C20:1 *trans* – Methyl 11-Transeicosenoate
12). C22:1 *trans* – Methyl Brassidate
13). C18:1 *trans* – Methyl Ricinelaidate

Table 1
Equations, correlation coefficients, LOD, LOQ and recovery percentage of the *trans* fatty acids (TFAs) determined in the mixtures standard

TFAs	Calibration curve equation	Coefficient correlation (r^2)	LOD [µg/ml]	LOQ [µg/ml]	Recovery [%]
C14:1 *trans*	y = 18873x - 434472	0.9903	0.09	0.27	98.21
C15:1 *trans*	y = 18784x - 383884	0.9907	0.08	0.24	97.22
C16:1 *trans*	y = 18873x - 356196	0.9868	0.09	0.27	96.83
C17:1 *trans*	y = 18414x - 308274	0.9877	0.08	0.24	98.54
C18:2 *trans*	y = 44589x - 688326	0.9901	0.07	0.21	96.99
C19:1 *trans*	y = 71377x - 2E+06	0.9898	0.06	0.18	96.37
C20:1 *trans*	y = 19800x - 449163	0.9886	0.05	0.15	95.72
C22:1 *trans*	y = 12596x - 352393	0.9832	0.03	0.10	94.41
C18:1 *trans*	y = 16812x - 445617	0.9883	0.03	0.10	93.96