VOLATILES OTHER THEN ETHANOL IN UNRECORDED AND RECORDED FRUIT SPIRITS IN SERBIA – HEALTH RISK ASSESSMENT

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INTRODUCTION

Mortality attributed to alcohol consumption remains a problem in countries located at Southeast Europe and consumption of unrecorded homemade spirits is stated to be one of the leading causes. Some alcoholic beverages contain volatile components other than ethanol. Methanol has been described to be the most common cause for surrogate toxicity, while acetaldehyde may contribute to the carcinogenicity and higher alcohols have also been speculated as a cause for unrecorded alcohol toxicity (liver cirrhosis) in eastern Europe. They are not subject to safety control, thus raising the question about health risks related to the presence of carcinogenic and non carcinogenic volatiles.

MATERIAL AND METHODS

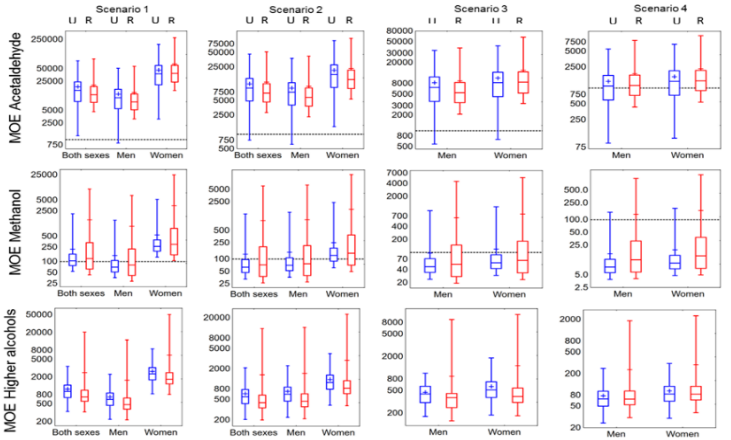
Out of 153 fruit spirit samples collected during 2020 in Vojvodina (Serbia), 26 with tax stamp were marked as recorded, whereas 127 produced in private homes or small scale distilleries and obtained mainly directly from the producers as unrecorded. All samples were analyzed by HSS-GC-FID for the presence of acetaldehyde, ethyl acetate, methanol and higher alcohols (n-propanol, n-butanol, isobutanol, isoamyl alcohol, n-amyl alcohol) and margin of exposure approach was used to assess the health risk of unrecorded and recorded spirits.

MOE = NOAEL (BMDL)/Estimated Exposure Dose

The cut-off point for public health safety:
Carcinogens 1000
Non carcinogens 100

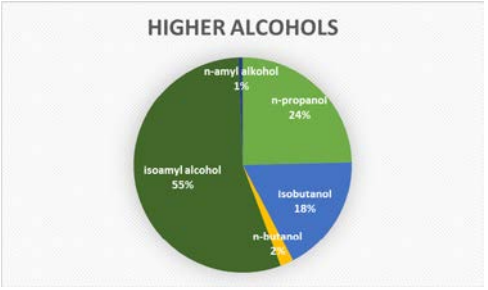
For the the daily alcohol consumption in Serbia four scenarios were employed:
Scenario 1 - average consumption on the population level (per capita consumption averaged across the entire population aged 15+)
Scenario 2 - regular drinkers only (total population aged 15+ minus abstainers)
Scenario 3 - chronic heavy drinkers version A (share of recorded and unrecorded alcohol consumption)
Scenario 4 - chronic heavy drinkers version B (exclusive consumption of recorded or unrecorded spirits)

RESULTS



The MOE values for possibly carcinogenic acetaldehyde dropped below 1000 only at average consumption level for 2% of unrecorded spirits in man, rising up to around 40% for both men and women considering consumption of solely unrecorded or around 30% in case of exclusive consumption of recorded spirits. Most worrying situation was noticed for methanol where in average consumption scenario MOE values dropped below 100 in 73% of unrecorded and 58% of recorded samples for man, rising up to 85% for recorded and even 97% for unrecorded spirits in chronic heavy drinkers scenario B. Higher alcohols exerted health risk only in chronic heavy drinkers scenario version B (around 70% for both types of spirits), while only 4% of recorded spirits posed a risk for woman in heavy drinkers scenario version A .
Both unrecorded and recorded spirits posed, in some extent, higher risk for man than for women.

The main differences in the health risk between recorded and unrecorded spirits were noticed in the case of heavy drinkers who exclusively consume unrecorded or recorded spirits which is quite unrealistic scenario.



Isoamyl alcohol contributed the most in cumulative risk of higher alcohols, since margin of exposure for isoamyl alcohol dropped below 100 for around 40% of samples for man and 20% for women in heavy drinkers scenario version B, while the risk of all other analysed higher alcohol was minor. Additionally, content of isoamyl alcohol contributed the most in total content of higher alcohols.

CONCLUSION

- Study results revealed a significant health concern due to the the volatiles intake via fruit spirit products, encouraging an active approach towards establishing the guidelines for volatile contents.
- There was no substantial difference in the consequent health risk of these two types of products, thus control measures should be included in order to maintain the quality of both recorded and unrecorded spirits and minimize the potential adverse health effects.