Gamma glutamyl transferase in 1744 patients with obstructive sleep apnea

A. Sánchez-Armengol^{1,3} · P. Villalobos-López² · C. Caballero-Eraso^{1,3} ·
C. Carmona-Bernal^{1,3} · M. Asensio-Cruz¹ ·
F. Barbé^{4,5} · F. Capote^{1,3}

Received: 8 April 2015 / Revised: 7 June 2015 / Accepted: 16 June 2015 / Published online: 9 July 2015
© Springer-Verlag Berlin Heidelberg 2015

Dear Editor:

Tomoyuki Kawada [1] suggests a number of considerations in order to improve the quality of our paper: “Gamma glutamyl transferase and oxidative stress in obstructive sleep apnea: a study in 1744 patients.” We are grateful for these comments and queries. Below, we itemized our response to the comments.

As Kawada describes in the letter to the editors regarding our paper published in this journal, we have considered the alcohol consumption as a quantitative continuous variable calculated in grams/day according to the formula “alcohol (g)=ml×degrees×0.008” for the univariate and multivariate analysis [2]. Although alcohol degree is usually expressed in degrees, in terms of health it is very important to calculate the grams of alcohol content of a drink. The formula we have used, which is supported by the Ministry of Health of the Spanish Government, determines the grams of absolute ethanol ingested and is not a simple formula, because it takes into account the degrees of drink consumed and density of alcohol. On the other hand, although in the univariate and multivariate analysis we have considered alcohol as a quantitative variable,

we have also used the level of alcoholic consumption as a categorical data, since we have studied the population according to the alcohol consumption of the individuals. We have divided the individuals in two groups according to the consumption of ≥ 30 g alcohol/day or < 30 g alcohol/day. We have used this cutoff in order to reasonably used the definition of nonalcoholic fatty liver disease.

Additionally, we have performed the same analysis, establishing the cutoff level of $>$ or < 80 g of alcohol/day because epidemiological studies used the limit of 60–80 g of alcohol daily as a risk factor for the development of alcoholic liver disease. In this analysis (not included in the final version of the manuscript), we obtained that excluding the patients with alcohol intake of ≥ 80 g/day, the results were similar to those obtained when the cutoff value was set to ≥ 30 g/day.

Regarding the second comment of the author in relation to the statistical study, we should mention that due to the complex database with a large number of subjects and variables we had, we have been supported by the statistical department of our hospital. In order to clarify the parameters we used in the multivariate analysis (Table four of the original paper), we have added Table 1.

Indeed, we have inserted the apnea-hypopnea index (AHI) as a continuous and also as a binary variable in the multivariate logistic regression test. The variables (continuous value and categorical values) that showed a statistical significance with GGT levels in the binary logistic regression model were included in the multivariate logistic regression model, using the “Entry” method (for this reason, we introduced in the model all the respiratory variables).

Moreover, contrary to Tomoyuki Kawada’s suggestion, during the “review process” of our paper in this journal we were suggested to include in the logistic analysis, besides the AHI, the desaturation index (DI), and CT₉₀, the presence of severe OSA (AHI₃₀=AHI ≥ 30).

✉ C. Caballero-Eraso
ccaballero-ibis@us.es

¹ Medical-Surgical Unit of Respiratory Diseases, Virgen del Rocío University Hospital, Calle Águilas n 16 casa 1, Mairena del Aljarafe, Sevilla 41003, Spain

² Torrecárdenas Hospital, Almería, Spain

³ Biomedical Research Institute, Sevilla, Spain

⁴ Respiratory Department, Arnau de Vilanova Hospital, Lleida, Spain

⁵ CIBERes (Centro de Investigación Biomédica en Red de Enfermedades Respiratorias), Mallorca, Spain

Table 1 Parameters included in the multivariate logistic regression test

	B	E.T.	Wald	gl	Sig.	Exp (B)
Age	−0.033	0.007	22.390	1	0.000	0.967
Gender	0.111	0.244	0.206	1	0.658	1.117
BMI	0.022	0.014	2.730	1	0.098	1.023
Glucose	0.006	0.002	7.108	1	0.008	1.006
Total cholesterol	0.005	0.002	8.763	1	0.003	1.005
Triglycerides	0.004	0.001	14.736	1	0.000	1.004
AHI	−0.004	0.007	0.224	1	0.636	0.996
DI	0.007	0.006	1.491	1	0.222	1.007
CT ₉₀	−0.003	0.005	0.533	1	0.465	0.997
Dyslipidemia	0.015	0.154	0.010	1	0.920	1.016
AHI_5	−0.195	0.263	0.549	1	0.459	0.823
AHI_10	0.202	0.250	0.652	1	0.420	1.224
AHI_30	0.224	0.288	0.603	1	0.437	1.251
Alcohol grams	0.011	0.002	35.808	1	0.000	1.011

BMI body mass index=weight in kilogram/height in square meters, *AHI* apnea-hypopnea index=number of apneas+hypopneas/hour of sleep or recording, *DI* desaturation index=number of desaturations/hour of sleep or recording; CT₉₀ percentage of TTR with SaO₂<90 %

Regarding the commentary about “the use of a standard classification, which was described in their “Material and methods” as mild, moderate and severe in case of categorical AHI indices,” we agree with the author and we appreciate this consideration. Nevertheless, the differences we could find using the cutoff of AHI 15 instead of 10 would not be statistically relevant and we think that the most important question is the classification of mild and severe OSA (AHI≥5 and AHI≥30), which was performed correctly.

The author describes that the standard error of waist-hip ratio was very big; nevertheless, the standard error of waist-hip ratio in the overall series was 0.08 (values 0.96±0.08). This value is not higher than the standard error of other parameters included in the multivariate logistic regression test, such as age or BMI, as shown in Table one of the original paper.

Finally, relating the effects of alcohol consumptions in OSA, we agree with the author that the effects of alcohol consumption in OSA are widely known, but we should also keep in mind that this effect might have been underestimated in the regular drinkers if they had not drunk the night of the overnight sleep study. In our practice, we advise the patients they should not drink alcohol, and we inform them about the risks of excessive intake. Because of this reason, we think that the night of the overnight sleep study should be representative of their future everyday life.

Conflict of interest The authors declare that they have no competing interests.

References

1. Kawada T Serum gamma glutamyl transferase in patients with sleep apnea-hypopnea. SLBR-D-15-00128
2. Sánchez-Armengol A, Villalobos-López P, Caballero-Eraso C, Carmona-Bernal C, Asensio-Cruz M, Barbe F, Capote F (2015) Gamma glutamyl transferase and oxidative stress in obstructive sleep apnea: a study in 1744 patients. Sleep Breath. doi:[10.1007/s11325-014-1115-5](https://doi.org/10.1007/s11325-014-1115-5)