Statistical analysis

Results are expressed as mean ± SD. Data were analysed by x^2 (two-by-two with Yate's correction), Fisher's exact test, Mann-Whitney U-test (MWU), Kruskal-Wallis test and Spearman's rank correlation (r), where applicable. The variables significant in the univariate analysis entered a binary logistic regression model. Two-sided p values less than 0.05 were considered statistically significant. Confidence intervals (95% CI) were determined using the formula $P = p \pm 1.96\ (pq/n)^{1/2}$ where p is the frequency, q is 1-p and n is the number of individuals tested from each group. The Documenta Geigy Scientific Table (Ciba-Geigy Ltd, Basle, Switzerland, 1972 7th edition) was used for 95% CI when fewer than 41 individuals were tested.

Results

The relevant demographic, clinical, biochemical, serological, and histological data required for the calculation of the revised IAHG score in the study population are shown in Table 1.

Specificity and sensitivity of IAHG score

The overall specificity (correctly negative/correctly negative + false positive) of the revised IAHG scoring system for the diagnosis of AIH in the context of the presence of another liver disease was 98.1% (95% CI: 96.8–99.4%) (Table 2). In more detail, the specificity of the revised IAHG scoring system for each liver disease was: 99.1% (95% CI: 97.3–100%) in HBV, 98.9% (95% CI: 97–100%) in HCV, 96.4% (95% CI: 91.5–100%) in NAFLD, 96.1% (95% CI: 90.7–100%) in ACLD namely 98% (95% CI: 93–100%) in PBC and 92.3% (95% CI: 82.1–100%) in PSC, 96.9% (95% CI: 90.9–100%) in patients with liver disorders of undefined origin and 100% in patients with ALD, HDV and miscellaneous hepatic disorders (Table 2).

Only 8 out of 423 patients had an AIH score between 10 and 15 (probable AIH), while none of these patients had a score above 15 (definite AIH). During a follow-up period of 30–52 months, 7 patients did not develop other features supportive of AIH diagnosis, while they responded favourably to the treatment given according to their original diagnosis. The eighth patient that was classified initially as liver disorder of undefined origin has been lost in follow-up.

The sensitivity (correctly positive/correctly positive + false negative) of the revised IAHG scoring system for detecting AIH in association with any kind of other liver disease (n = 24) was 66.7% (95% CI: 44.7–84.4 %) with 8 out of 24 patients (3 with AIH/PBC, 2 with AIH/PSC, 1 with AIH/ALD, 1 with AIH/HBV and 1 with AIH/HCV) achieving aggregate score <10. The remaining 16 patients (4 with AIH/PBC, 1 with AIH/PSC, 1 with AIH/ALD, 4 with AIH/NAFLD, 3 with AIH/HBV, 1 with AIH/HDV and 2 with AIH/HCV) had an AIH score between 10 and 15. In more detail, the sensitivity of the score for detecting AIH in patients with AIH/PBC or AIH/PSC overlap syndromes (n = 10) was 50% (95% CI: 19–81%) with 5 out of 10 patients with AIH/overlap syndromes achieving score <10. However, the score was more sensitive in the detection of the coincidence of AIH and other liver disease (n = 14): 78.6% (95% CI: 57.7–100%) with only 3 out of 14 patients achieving score <10.

Parameters that associated with increased AIH score in patients with chronic liver diseases (n = 423)

In the univariate analysis, parameters that significantly differed between patients with liver diseases achieving AIH score between 10 and 15 (n = 8) and those having a negative score (aggregate score less than 10; n = 415) were as follows: a) positive (≥1) score in liver biopsy (p = 0.015) and b) total score from the biopsy (p < 0.001) (Table 3). After binary logistic regression analysis we found that the total histological score obtained from liver biopsy, was the only independent factor that significantly associated (p = 0.003) with a probable AIH score in non-AIH patients with chronic liver diseases. Finally, the aggregate score was significantly higher in the group of patients with probable score compared to those achieving a negative AIH score (11.63 ± 1.19 vs 2.29 ± 4.07; p < 0.001; Table 3).

Comparisons between groups

In total (n = 24), patients with AIH/overlap syndromes and AIH with concurrent other liver diseases had significantly more frequently a positive score (≥1) in liver biopsy (p < 0.001), higher total histological score (p < 0.001), higher frequency of a positive score for serum globulin or IgG increase (p = 0.035) and higher frequency of concurrent autoimmune diseases (p = 0.001) compared to those with liver diseases other than AIH (n = 423; Table 4). In addition, patients with AIH/overlap syndromes and AIH with concurrent other liver diseases (n = 24) tended to have more frequently autoantibodies detection compared to those (n = 423) with liver diseases other than AIH (p = 0.06; Table 4). However, when the variables, which were significant in the univariate analysis, entered the binary logistic regression model, the total histological score (p < 0.001), the seropositivity for autoantibodies (p < 0.05) and the presence of other autoimmune diseases (p < 0.001) were identified as independent predictors for the presence of AIH associated with any kind of other liver disorders.

After comparisons of the parameters of IAHG score among the group of patients with chronic liver disorders other than AIH (n = 423), the group of patients with AIH/overlap syndromes (n = 10) and the group of patients