



# Sunnybrook and House-Brackmann Systems in 5,397 Facial Gratings

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## ABSTRACT

**OBJECTIVES:** To study the correlation between Sunnybrook and House-Brackmann facial grading systems at different time-points during the course of peripheral facial palsy.

**STUDY DESIGN:** Prospective multi-center trial.

**SETTING:** Seventeen otorhinolaryngological centers.

**SUBJECTS AND METHODS:** Data are part of the Scandinavian Bell's palsy study. The facial function of 1,920 peripheral facial palsy patients was assessed 5,397 times with both Sunnybrook and House-Brackmann (H-B) facial grading systems. Grading was done at initial visit, at days 11 to 17 of palsy onset, at 1 month, 2 months, 3 months, 6 months, and at 12 months. Statistical evaluation was by Spearman correlation coefficient and box plot analysis.

**RESULTS:** Spearman correlation coefficient varied from -0.81 to -0.96, with the weakest correlation found at initial visit. Box plot analysis for all assessments revealed that Sunnybrook scores were widely spread over different H-B grades. With 50 percent of the results closest to the median, Sunnybrook composite scores varied in H-B grades as follows: H-B I, 100; H-B II, 71 to 90; H-B III, 43 to 62; H-B IV, 26 to 43; H-B V, 13 to 25; and H-B VI, 5 to 14

**CONCLUSION:** Gratings correlated better in follow-up assessments than at initial visit. As shown by the wide overlap of the grading results, subjective grading systems are only approximate. However, a conversion table for Sunnybrook and H-B gradings was obtained. It can be used for further development of facial grading systems.

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## OBJECTIVES

We used Sunnybrook<sup>1</sup> (Figure 1) and House-Brackmann (H-B)<sup>2</sup> (Table 1) grading systems concurrently in 5,397 gradings of facial palsy patients in a prospective study to see how the two systems correlate. Our interest was also to investigate whether Sunnybrook composite scores and H-B grades follow a pattern, thereby permitting a transfer table between the two systems. We also studied the association between the two systems at different times of palsy duration.

H-B system has been criticized over the years and was published recently with certain changes, nevertheless with the conclusion that the new scale maintains agreement comparable to the original scale<sup>3</sup>. At the time of this study, only the original H-B system was published and used.

## METHODS AND MATERIALS

Study data are from the prospective, randomized, double-blind, placebo-controlled multi-center Scandinavian Bell's Palsy Study (SBPS)<sup>4</sup>. Bell's palsy patients, 18-75 years old with onset of palsy within 72 hours, were randomized to treatment with placebo, prednisolone, valacyclovir, or a combination of the two latter drugs. Follow-up time was 12 months.

Facial grading was assessed for each patient by the Sunnybrook and the H-B system. Assessments were made within 72 hours of palsy onset (initial visit), at days 11 to 17 of palsy onset, at 1 month, 2 months, 3 months, 6 months, and at 12 months. If the patient had recovered completely at two or three months, the next visit was at 12 months.

In addition to the 833 patients that were included in the SBPS (investigating treatment), 1087 patients screened at initial visit were excluded because they did not meet the inclusion criteria<sup>4</sup>. These patients had both Sunnybrook and H-B gradings performed simultaneously at their initial visit and were included in this study (investigating grading). Since the material is from the SBPS, these patients will be referred as "not-included patients". Altogether, facial function was assessed 5,397 times in 1,920 patients by both Sunnybrook and H-B facial grading systems concurrently.

To investigate the association, box plot analysis was used to show how Sunnybrook composite scores from 0 to 100 associate with H-B grades I to VI. Eleven different groupings of gradings were assessed (see results). Spearman correlation coefficients were also calculated for these same groupings.

Figure 1. Sunnybrook facial grading system.



Patient with sequelae after right-sided peripheral facial palsy

Table 1. House-Brackmann facial grading system.

## RESULTS

Spearman correlation coefficient varied from -0.814 to -0.965. It was -0.830 in initial visit gradings of not-included patients (n = 1,087); -0.814 in initial visit gradings of included patients (n = 833); -0.824 in initial visit gradings of not-included and included patients together (n = 1,920); -0.920 in gradings from day 11 to 17 (n = 804); -0.957 in one-month visit (n = 719); -0.965 in two-months visit (n = 636); -0.955 in three-months visit (n = 334); -0.918 in six-months visit (n = 241); -0.902 in 12-months visit (n = 743); -0.958 in all included patients' gradings (n = 4,310); and -0.949 in all 5,397 gradings together.

The range of Sunnybrook composite scores (0-100) in different H-B grades (I-VI) in 5,397 gradings varied as seen in Figure 2.

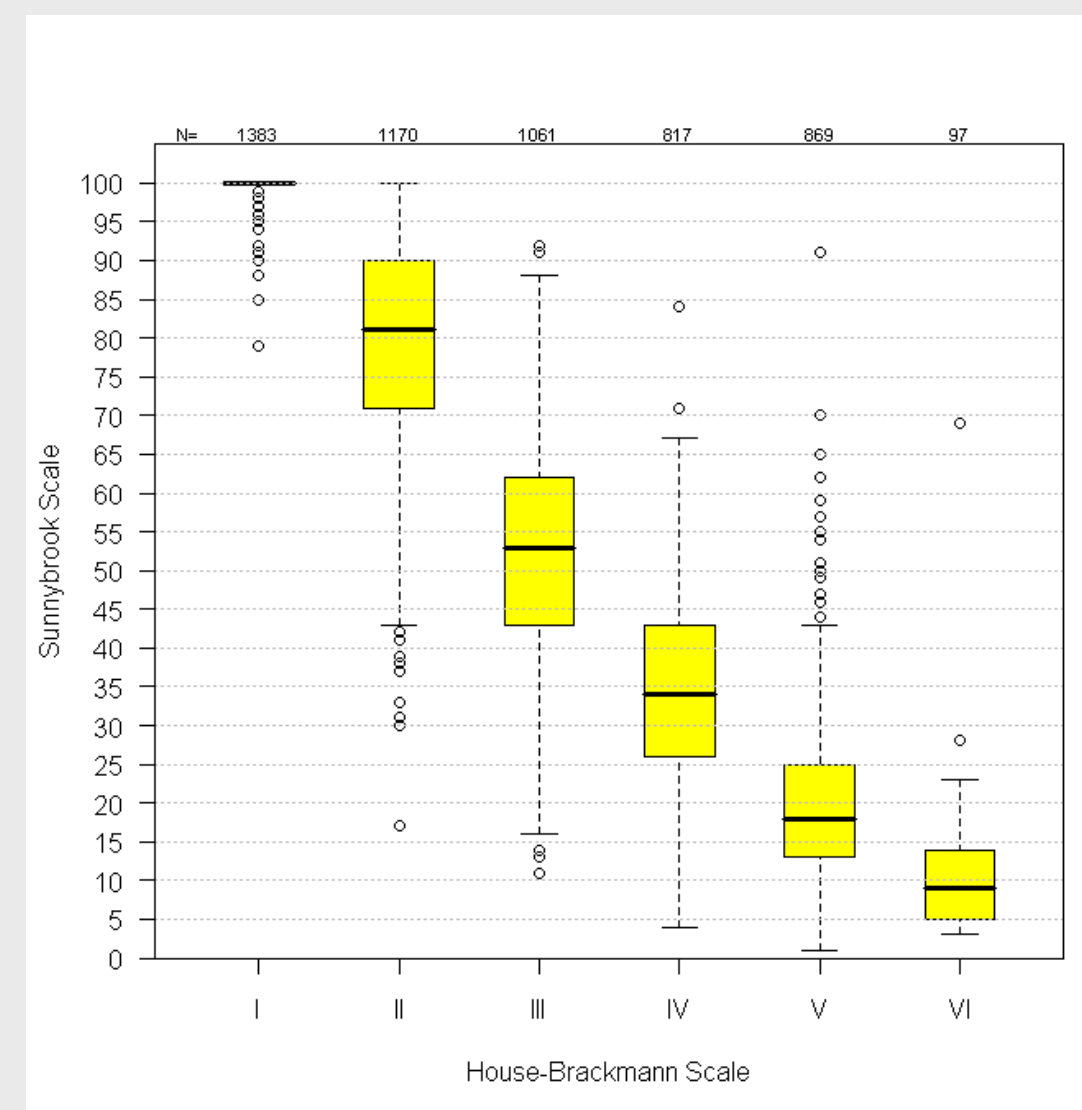


Figure 2. Sunnybrook composite score grading results (0-100) in relation to House-Brackmann grades (I-VI) with box plot analysis of 5,397 facial gradings. The boxes indicate the lower and upper quartiles. The central line is the median. The ends of the whiskers show the maximum and minimum values. Outliers are presented as open circles.

	This study n = 5,397	Kanerva et al. <sup>5</sup> n = 432	Berg et al. <sup>6</sup> n = 100
H-B I	100 (100)	100 (100)	-
H-B II	71-90 (81)	70-88 (81)	66-75 (70)
H-B III	43-62 (53)	42-64 (53)	39-54 (47)
H-B IV	26-43 (34)	25-45 (35)	23-40 (29)
H-B V	13-25 (18)	15-30 (22)	10-24 (16.5)
H-B VI	5-14 (9)	-	9-15 (9)

Table 2. Sunnybrook composite score interquartile range (IQR) and median (Q2) as defined by box plot analysis in relation to House-Brackmann (H-B) grades (I-VI) in different studies.

	Sunnybrook composite score
H-B I	100
H-B II	70-99
H-B III	43-69
H-B IV	26-42
H-B V	13-25
H-B VI	0-12

Table 3. Conversion table for Sunnybrook composite scores (0-100) in relation to House-Brackmann (H-B) grades I-VI.

## DISCUSSION

When evaluating the congruence between H-B and Sunnybrook over time, the lowest correlation was demonstrated at initial visit. The difference in the gradings may be explained by that palsies at follow-up have other characteristics than acute stage palsies. It may also be speculated that in early stages, facial weakness varies along the different branches of the facial nerve and that the global H-B system may then not reflect the score of the weakest branch, with subsequent incongruence between the systems. Furthermore, the initial visit gradings in the SBPS were often done by a resident on call whereas the gradings at follow-up visits were done by ENT-specialists; more experienced doctors may be more critical and demanding and thereby prone to place patients in H-B grade III rather than grade II.

Considerable overlap between the H-B and Sunnybrook gradings was found. If, however, 50% of the assessments closest to the median (interquartile range, IQR) are presented (Table 2), the overlapping intervals shorten and thereby allow the construction of a more lucid conversion table. The IQRs in the present study were in agreement with the results in our previous H-B and Sunnybrook grading studies<sup>5,6</sup> (Table 2). Based on our previous and present results, we present as Table 3 a conversion table for H-B and Sunnybrook grading systems.

## CONCLUSIONS

The congruence between the H-B and Sunnybrook grading systems was greater in follow-up assessments than at initial visit. The wide overlap between H-B grades and Sunnybrook composite scores indicated that subjective grading systems are approximate. However, with 5,397 concurrent gradings a pattern emerged between these two grading systems allowing the introduction of a conversion table. Our results can help to understand how physicians use these grading systems in everyday clinical settings, and to further guide the development of more accurate facial grading systems.

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