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Evaluation of a biofeedback splint “bruXane” for sleep bruxism and related pain

AN INTRA-SUBJECT CONTROLLED TRIAL

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Abstract

Objective: To analyse the intra-subject effect of treatment with a full occlusal biofeedback splint ("bruXane") on sleep bruxism ("SB") and related pain by measuring various parameters of bruxing activity and pain perception.

Method: 57 German patients randomly, either directly or through their dentist, approached the manufacturer (bruXane GmbH, Marburg, Germany) expressing a willingness to test the biofeedback splint ("bruXane"). Each wore the splint first in record-only mode, i.e. without biofeedback (baseline phase), followed by treatment with the splint with the biofeedback switched on (treatment phase). The frequency and duration of bruxing events ("bursts") were captured on a continuous basis and various symptoms and functional limitations were recorded by means of questionnaires immediately before the baseline phase and immediately after the treatment phase. Statistical tests were run to establish whether there was a significant difference in outcomes before and after treatment.

Results: Treatment with the biofeedback splint led to very early and statistically significant reductions in both the frequency and duration of bursts. On 13 out of 15 symptoms and 5 out of 8 functional limitations, treatment led to a statistically significant reduction in the intensity of discomfort.

Conclusion: The results indicate that intra-buccal biofeedback by way of vibration in combination with a dental splint is effective in the treatment of sleep bruxism at the subconscious level, i.e. without waking the patient. It is particularly effective for patients showing higher levels of bruxing activity.

Clinical relevance: By reducing the quantum and duration of bruxing activity bruXane reduces excessive load on the masticatory system. This is reflected in the observed improvement in patient symptoms. bruXane can therefore provide relief to bruxism sufferers in the short term and prevent long term damage to the temporomandibular joint.

Contents

Introduction

Bruxism (teeth grinding and clenching) is sufficiently widespread in the population that it has been extensively studied and reported on in the scientific literature. Bruxism occurs within a wide range of intensity. At higher levels it is considered to be a parafunctional activity in that it serves no useful purpose but causes various forms of damage to the sufferer; from drastic erosion of the dentition to sometimes debilitating levels of pain not only in the facial area but also in the neck, shoulders and back. Additionally, it can cause functional debility, including limitation in the manoeuvrability of the jaw which affects the ability to speak and eat.

Biofeedback is a method by which, when a pre-defined and targeted (harmful) activity or state of the patient occurs, a stimulus is triggered which is fed back to the patient enabling her to become aware of that activity or state. The intention is to enable the patient to take corrective action. Various studies have shown that this can be an effective means of treatment.

In most cases biofeedback is undertaken when the patient is awake. A challenge when addressing sleep bruxism ("SB"), is whether biofeedback can be effective when the patient is not conscious, i.e. when asleep. At least one study[1] suggests that this may be possible.

This study assessed the effect of treatment with the biofeedback splint "bruXane" on a group of bruxers and sought to answer the following questions:

1. Does treatment with the biofeedback splint lead to a significant improvement in patients' bruxism symptoms?
2. Can treatment with the biofeedback splint significantly reduce bruxing activity?

Materials and Methods

Sample size and source

57 German bruxism patients, who explicitly declared their consent, participated in this study. Either directly or through their dentist they learned that the manufacturer of the biofeedback splint was recruiting testers.

37 subjects completed questionnaires relating to symptoms.

No bruxing or symptom data collected was excluded from the final analysis, unless valid comparative data was not available (e.g. if the subject completed the pre-test questionnaire but did not submit the post-test questionnaire).

[1] Arzi A, Shedlesky L, Ben-Shaul M, Nasser K, Oksenberg A, Hairston IS, et al. Humans can learn new information during sleep. Nature neuroscience. 2012;15(10):1460-5.

Subjects and test duration

The test ran from July 2014 to March 2017.

Parameter	Total	Women	(%)	Men	(%)
Number (bruxing data)	57	40	70%	17	30%
Average age	39.6	38.0		43.5	
Maximum age	64.0	60.0		64.0	
Minimum age	21.0	21.0		29.0	
Mean baseline duration (weeks)	3.6	3.4		4.2	
Mean baseline duration SD[2] (weeks)	1.9	1.9		1.8	
Mean treatment duration (weeks)	8.7	8.3		9.5	
Mean treatment duration SD (weeks)	6.0	5.6		6.5	

Randomisation and blinding

Randomisation was limited to self-selection by the patients themselves. The subjects self-certified that no conditions (exclusion criteria) applied that would make the use of the biofeedback splint inappropriate. A full list of these conditions is available on request. No qualifying patients who expressed an interest in participating in the test were excluded and so the patients were self-selected.

As it was unavoidably obvious to the subject when the biofeedback was activated, a subject-side blinding was not possible. The author of this report collected and analysed the data and so an analyst-side blinding did not occur.

Description of device

The biofeedback splint “bruXane” (bruXane GmbH, Marburg, Germany) was made of two maxillary full-coverage thermoforming soft dental plates between which were sealed a pressure-sensitive sensor along the whole of the occlusal surface and electronic components housed in the palatal area including a rechargeable battery, a vibrating motor and a microcontroller.

All devices were made by the same technician in a prosthetic dental laboratory.

Analogue maxillary and mandibular impressions were created under constant procedure with the same team. Plaster casts were made, analysed and mounted in a semi-adjustable articulator.

The microcontroller continuously monitored the resistance level in the sensor. Occlusal pressure on the sensor reduced the electrical resistance level. When the resistance reduced below a pre-set trigger level, the microcontroller time-stamped this as the start of a bruxing event (burst) and simultaneously and, when in treatment mode, instantaneously switched the vibrating motor on. Release of the occlusal pressure increased the sensor´s electrical resistance level. When the resistance rose above the trigger level, the microcontroller time-stamped this as the end of the burst and simultaneously and instantaneously switched the motor off. The minimum measurable burst duration was 100 milliseconds and longer bursts were measured in 100 msec. increments.

[2] SD = Standard deviation

The trigger level was set to exclude normal activities like swallowing and coughing and very light occlusal pressure. The vibration also generated, by bone conduction, a sound which was audible to the patient in the awake state. Therefore the biofeedback system consisted simultaneously of two stimuli: kinesthetic and auditory.

Study design

Symptoms data: The assessment was performed using a questionnaire designed in-house (reproduced in Annex 1). The questionnaire captured the patients´ own assessment of various symptoms and functional limitations on a scale of 0-10[3] and was completed (a) prior to start of the test and (b) after the treatment phase. The questionnaire also asked how often the patient was woken up by the biofeedback during the treatment phase. By comparing the response with the number of recorded biofeedback activations for that patient we could assess to what extent the biofeedback worked at the sub-conscious level.

Bruxing data: Subjects wore the biofeedback splint in record-only mode every night for approximately 3 weeks. Thereafter they wore the splint with the biofeedback switched on nightly for an average of 9 weeks. Every burst during every night of the test was recorded.

All participants were instructed in the use of the splints and asked to refrain from regular or excessive alcohol consumption, as this could dampen the response to biofeedback stimuli.

The test occurred in the patient´s natural environment, i.e. during their normal daily routine. Control of compliance was achieved through the captured data and the usage logs.

Collection of bruxing data

Data collection was continual, not sampled, i.e. during each phase every burst during every sleep period was recorded.

The data stored in the microcontroller was periodically transferred by the subject to a computer as a .csv file and sent to the analyst. This was then analysed using proprietary software, which calculated the following *outcome variables* per subject sleep period (i.e. per night) from the raw burst data:

Total duration per hour ("TDPH"): the sum of the durations of each burst divided by the number of hours of the respective sleep period reported in seconds. This is representative of bruxing activity.

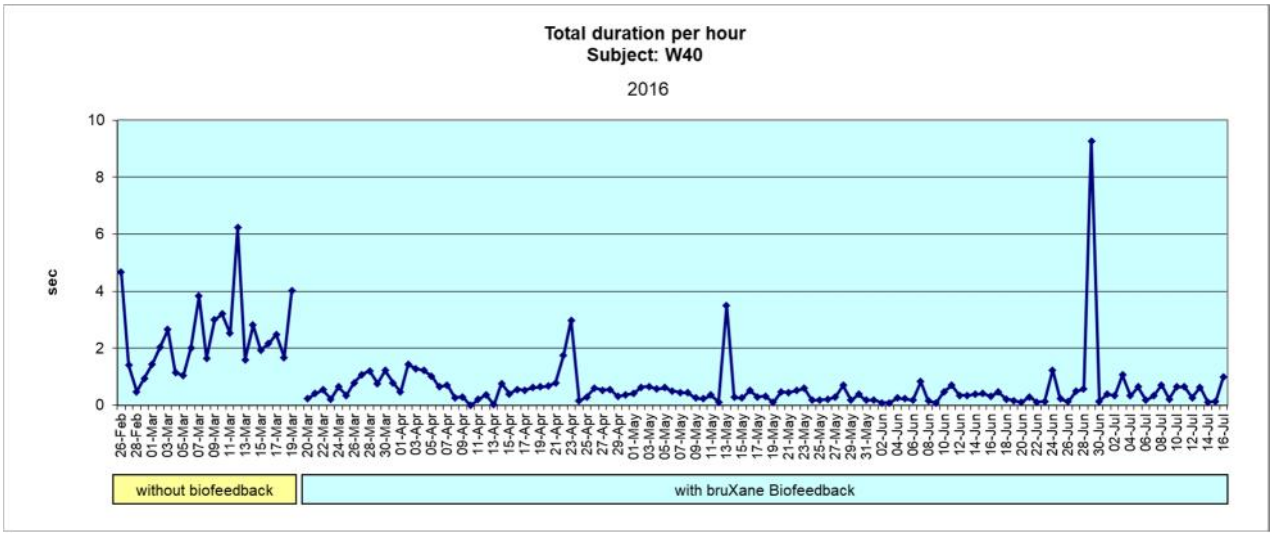
Bursts per hour ("BPH"): the number of bursts divided by the number of hours of the respective sleep period reported as units.

Average duration ("AD"): the sum of the durations of each burst divided by the number of bursts in the respective sleep period reported in milliseconds.

[3] The earlier subjects rated their symptoms on a scale of 0-6, which ratings were adjusted to a 10-scale for comparison with later subjects.

Maximum duration ("MD"): the duration of the longest individual burst in the respective sleep period reported in milliseconds. This is indicative of the maximum load being placed on the stomatognathic system.

By way of illustration, the following figure shows the nightly mean data for TDPH for a typical subject (subject mean change equivalent to the group mean change).



The statistical tests were based on the means (parametric tests) and medians (non-parametric tests) for each subject/phase combination.

Statistical analysis

For each subject the nightly bruxing data for each outcome was averaged for each phase. The group data for each phase comprised each subject´s average score. The questionnaire data collated each subject´s rating (a) pre-test and (b) immediately after the treatment phase.

Paired student´s t-tests and, for confirmation, Wilcoxon Signed-Ranks Tests ("WSRT") were performed on the bruxing data (baseline vs. treatment phase) and the WSRT was performed on the symptoms data (pre-test vs. post-test). p-values were calculated on a two-tailed basis.

The collected data were analysed using the Excel (Microsoft, Seattle, USA) and VassarStats (Dr. Richard Lowry, Vassar College, Poughkeepsie, USA) statistical packages.

Null Hypotheses

For each outcome variable the null hypothesis was that there was no difference in the means (or as the case may be, relative ranks) of the samples being compared.

Declaration

The author was a member of the project team of bruXane GmbH.

Results

Symptom data

Symptom	Mean symptom intensity[4]		Reduction		n[5] =	# (%) symptom-free after treatment
	Baseline	Treatment	Mean	Median		
Symptoms overall[6]	7,3	3,9	48%	56%	37[7]	1 (3%)
Facial pain	4,6	2,3	51%	60%	33	7 (21%)
Stiffness in the jaw	4,6	1,9	59%	80%	31	10 (32%)
Neck pain	6,7	3,9	42%	43%	30	1 (3%)
Pain in the jaw	4,4	2,6	41%	60%	29	6 (21%)
Headaches	4,6	2,8	38%	38%	29	6 (21%)
Clicking of the jaw	5,5	2,9	48%	50%	28	7 (25%)
Shoulder pain	5,5	2,9	48%	67%	28	4 (14%)
Tiredness of the jaw	3,6	1,6	55%	67%	27	10 (37%)
Back pain	5,4	2,7	49%	50%	27	6 (22%)
Grating noise	5,2	2,4	54%	67%	25	10 (40%)
Tinnitus	4,4	3,7	18%	13%	18	0 (0%)
Impaired vision	3,5	1,4	59%	67%	17	6 (35%)
Migraine	3,3	1,3	60%	75%	16	8 (50%)
Blocked jaw	3,7	1,7	54%	100%	14	8 (57%)

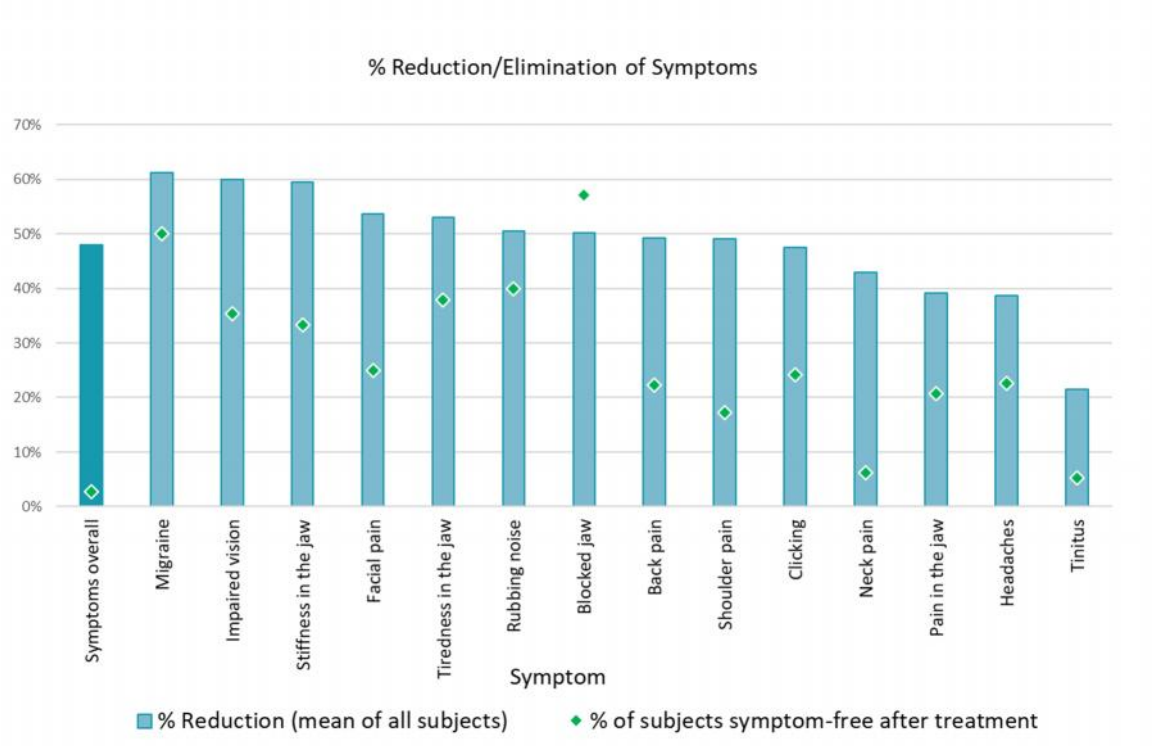
Statistical results

Results of the Wilcoxon signed-rank test are shown in the following table:

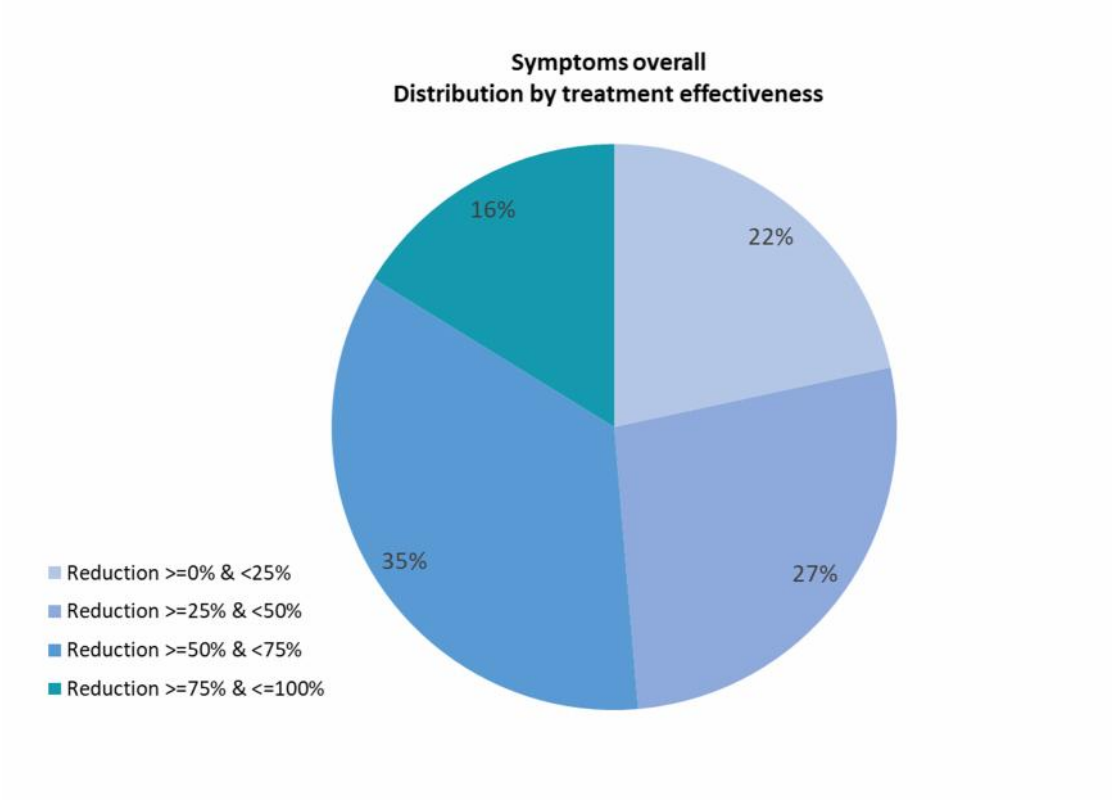
Symptom	% of subjects showing reduction	z =	p-value[8]	Remark
Symptoms overall	97%	5.23	0.0001	Statistically significant
Facial pain	76%	3.71	0.0002	Statistically significant
Stiffness in the jaw	81%	4.03	0.0001	Statistically significant
Neck pain	77%	3.85	0.0001	Statistically significant
Pain in the jaw	79%	3.48	0.0005	Statistically significant
Headaches	66%	3.22	0.0013	Statistically significant
Clicking	86%	4.27	0.0001	Statistically significant
Shoulder pain	75%	3.33	0.0009	Statistically significant
Tiredness of the jaw	74%	3.25	0.0012	Statistically significant
Back pain	85%	3.43	0.0006	Statistically significant
Grating noise	80%	3.40	0.0007	Statistically significant
Tinnitus	50%	1.21	0.2263	Not statistically significant
Impaired vision	71%	2.39	0.0168	Statistically significant
Migraine	69%	2.09	0.0366	Statistically significant
Blocked jaw	64%	1.71	0.0873	Not statistically significant

[4] On a scale of 0-10.
[5] Number of subjects who reported that symptom.
[6] This parameter captured the subject´s overall discomfort level (not specific to any individual symptom).
[7] Three subjects completed questionnaires but did not produce bruxing data as their bruXanes were not equipped with a microcontroller. Not all patients who generated bruxing data completed the questionnaires.
[8] Two tailed.

The % reductions in mean values and symptom elimination are depicted graphically in the following chart.



The following chart shows the proportion of subjects in each % reduction quartile.



For 51% of the subjects, symptom intensity was more than halved. 80% of subjects reported a satisfaction rating of 7 out of 10 or more with the treatment.

Functional limitation data

Functional limitation	Mean limitation intensity[9]		Reduction		n[10] =	# (%) discomfort-free after treatment
	Baseline	Treatment	Mean	Median		
Yawning	3.5	2.0	42%	67%	29	10 (34%)
Eating hard food	3.4	2.5	26%	33%	27	9 (33%)
Chewing	4.3	1.8	59%	71%	24	11 (46%)
Facial expressions	4.3	1.8	59%	71%	24	6 (38%)
Body mobility	3.7	1.7	55%	50%	24	10 (42%)
Smiling	2.2	0.8	64%	100%	15	9 (60%)
Eating soft food	2.1	1.3	40%	100%	12	7 (58%)
Brushing teeth	1.9	1.2	39%	67%	12	6 (50%)
Speaking	2.2	0.8	63%	67%	10	5 (50%)
Swallowing	3.3	1.3	61%	50%	7	3 (43%)
Drinking	0.8	0.6	25%	100%	5	3 (60%)

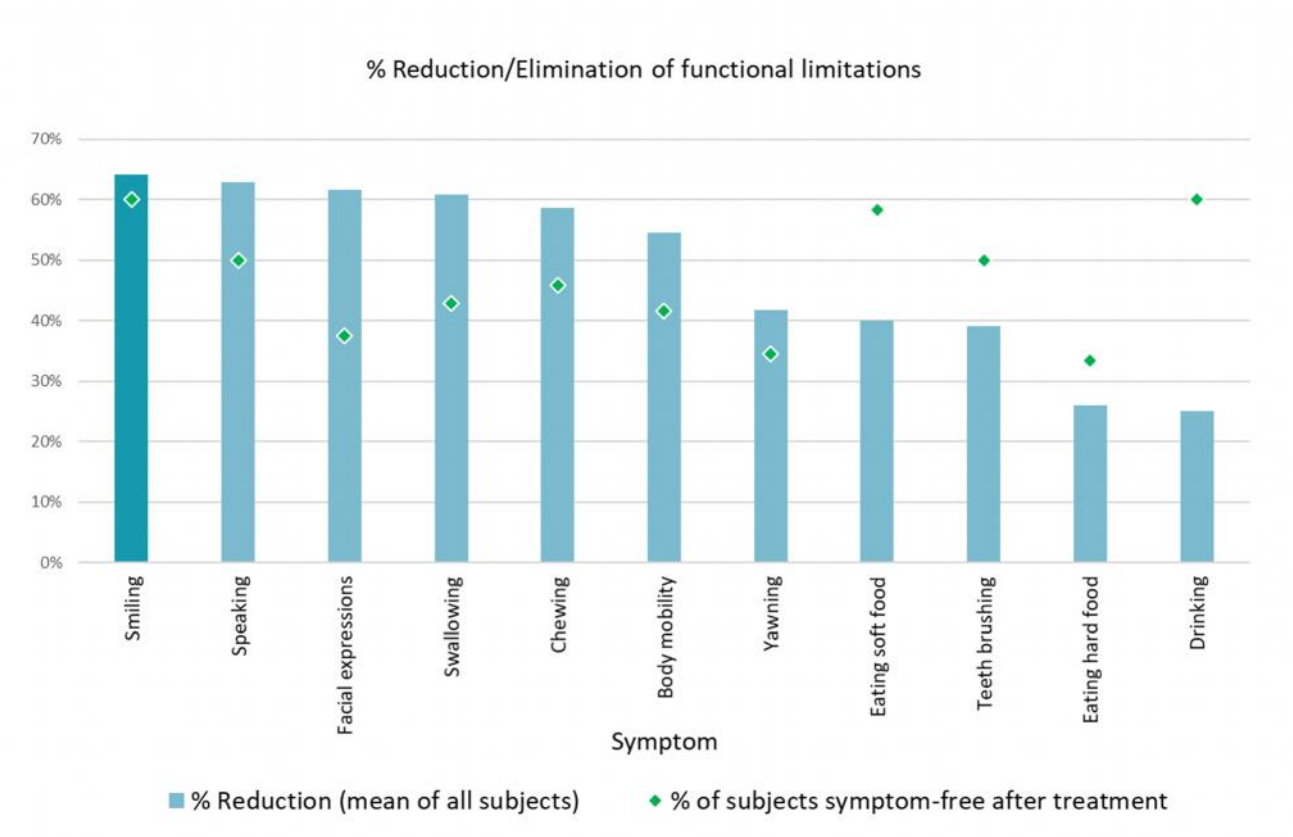
Statistical results

Results of the Wilcoxon signed-rank test are shown in the following table:

Functional limitation	% of subjects showing reduction	z =	p-value[11]	Remark
Yawning	69%	3.11	0.0019	Statistically significant
Eating hard food	63%	1.84	0.0658	Not statistically significant
Chewing	88%	3.32	0.0009	Statistically significant
Facial expressions	88%	3.32	0.0009	Statistically significant
Body mobility	75%	3.41	0.0006	Statistically significant
Smiling	73%	2.49	0.0128	Statistically significant
Eating soft food	58%	0.94	0.3472	Not statistically significant
Brushing teeth	50%	0.94	0.3472	Not statistically significant
Speaking	70%	n/a[12]		Sample too small
Swallowing	71%	n/a		Sample too small
Drinking	60%	n/a		Sample too small

[9] On a scale of 0-10.
[10] Number of subjects who reported that symptom.
[11] Two tailed.
[12] Not available

The % reductions in mean values and elimination of functional limitations are depicted graphically in the following chart.



Bruxing data

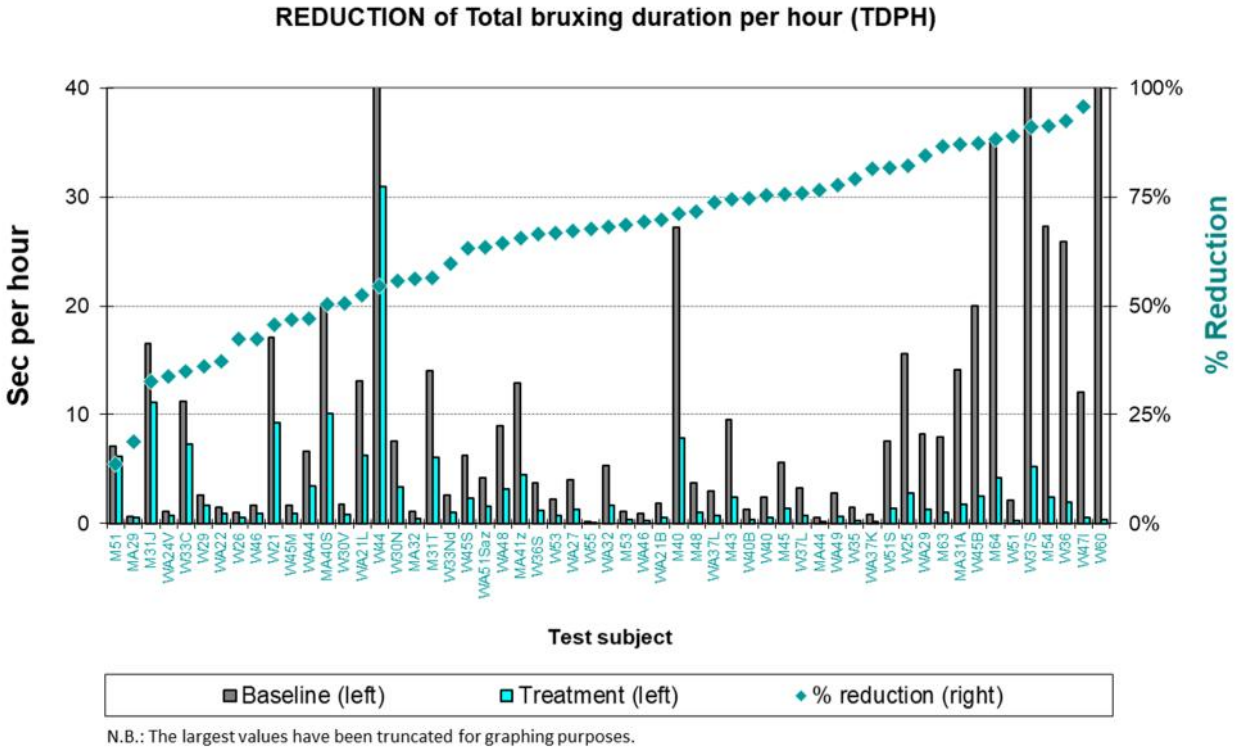
n=57	Baseline	Treatment	Reduction		Statistical tests (p values)[13]			
Bruxing variable[14]	**Mean**[15] **± SD**	**Mean ± SD**	**Mean**	**Median**	**t-test**[16]	**Remark**	**WSRT**[17]	**Remark**
TDPH (secs)	10.6 ± 14.7	2.9 ± 4.6	73%	76%	0.00001	Stat sig[18]	0.0001	Stat sig
BPH (units)	13.5 ± 20.7	6.1 ± 6.9	54%	57%	0.00653	Stat sig	0.0001	Stat sig
AD (msec)	799.7 ± 351.6	378.7 ± 126.5	53%	54%	0.00000	Stat sig	0.0001	Stat sig
MD (msec)	4,987 ± 4,195	1,690 ± 1,945	66%	79%	0.00000	Stat sig	0.0001	Stat sig

The distribution of the subjects by baseline bruxing intensity was:

TDPH (in each case n=14)	Mean			Median		
	Baseline	**Treatment**	**Reduction**	**Baseline**	**Treatment**	**Reduction**
1st quartile (lowest baseline activity)	1.1	0.5	55%	1.1	0.4	62%
2nd quartile	2.9	0.9	68%	2.7	0.8	69%
3rd quartile	8.9	3.2	64%	8.1	2.8	65%
4th quartile (highest baseline activity)	30.0	6.9	77%	23.1	4.7	80%

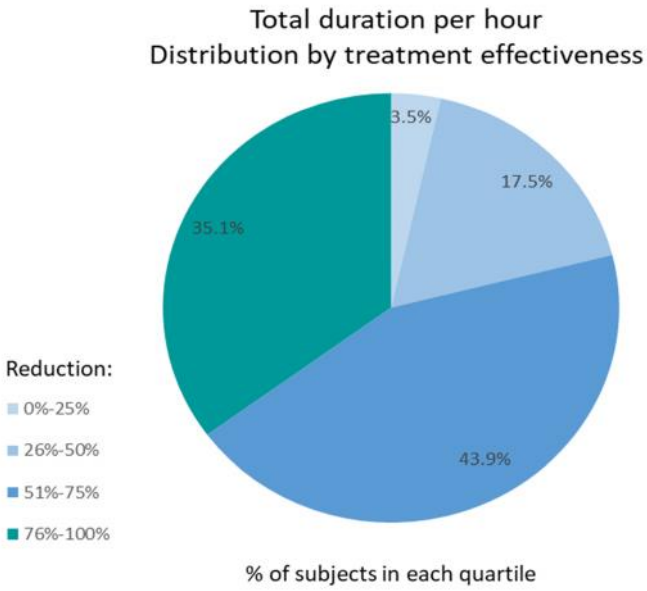
[13] Two-tailed
[14] For a full description of bruxing variables see the section Materials and Methods (pages 5 & 6)
[15] Mean of the individual patient values for this phase of the test.
[16] Student´s paired t-test
[17] Wilcoxon Sign-rank test
[18] Statistically significant

The reductions in bruxing activity of individual patients is depicted in the following graph:



The following chart shows the proportion of subjects in each % reduction quartile.

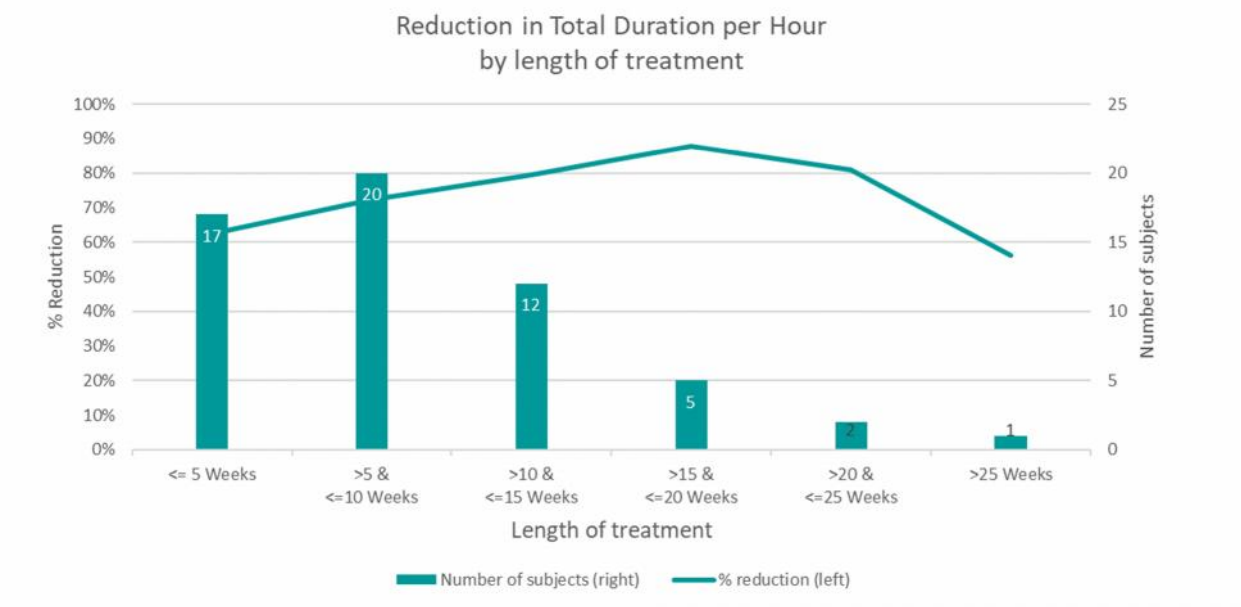
For 79% of subjects bruxing activity was more than halved.



The following table summarises the quartile distribution of subjects by treatment effectiveness for all bruxing variables.

% of subjects	Increase 0-25%	Reduction 0-25%	Reduction 26-50%	Reduction 51-75%	Reduction 76-100%	More than halved
TDPH	0%	3.5%	17.5%	43.9%	35.1%	78.9%
BPH	10.5%	29.8%	24.6%	22.8%	12.3%	35.1%
AD	0%	10.5%	40.4%	47.4%	1.8%	49.1%
MD	0%	10.5%	12.3%	29.8%	47.4%	77.2%

The following chart shows the effect of the length of treatment on the reductions in bruxing activity achieved:



Discussion

Symptoms and functional limitation

Does treatment with the biofeedback splint lead to a significant improvement in patients' bruxism symptoms?

Treatment with the biofeedback splint led to reductions in all reported symptoms and functional limitation parameters across the group of subjects and in some cases to the complete elimination of the complaint. The proportion of subjects reporting improvements ranged from 50% (tinnitus) to 97% (general discomfort perception). The latter indicates that almost all subjects found the treatment to be beneficial. In the case of symptoms, except for tinnitus and blocked jaw, the improvements in patient welfare (i.e. reduction in symptom severity) were statistically significant. Interestingly, whilst the reduction overall was not statistically significant, for the highest proportion of subjects reporting it (57%) the symptom of blocked jaw was eliminated entirely. Of the eight functional limitation parameters where the sample size was large enough to permit meaningful statistical tests, five showed statistically significant reductions.

As the monitored symptoms could have causes other than bruxism there is always the possibility that individual symptoms of certain patients may not reduce.

The questionnaires asked for the frequency with which subjects were woken during the treatment phase, i.e. to what extent the vibration and sound of the biofeedback caused them to wake up. We were able to compare this with the known number of incidences of the biofeedback being triggered in the form of the number of recorded bursts during the treatment phase. As the reported incidence of being woken was negligible compared with the number of recorded bursts, it is was established that the biofeedback is effective whilst the patient is asleep. This may be a significant finding.

Sleep quality: Subjects overwhelmingly stated that their sleep quality and operating effectiveness the following day had improved. The improved sleep quality was also noticed by those subjects who reported occasionally being woken up by the biofeedback early in the treatment phase.

Bruxing

Can treatment with the biofeedback splint significantly reduce bruxing activity?

Treatment with the biofeedback splint led to statistically significant reductions in all bruxing parameters. The largest reductions were shown by the subjects who had the highest baseline bruxing activity.

Total bruxing activity as represented by Total Duration per Hour has two components: the frequency of bursts and their duration. Both frequency (Bursts per Hour) and duration (Average Duration) of bursts contributed equally to the reduction in bruxing activity. This indicates that this treatment method may be better than some alternatives studied in the literature where reductions were noted in either frequency or duration of bursts but not in both.

Reductions in frequency and duration address different aspects of the patient´s response to any biofeedback system. Shorter duration indicates a conditioned response, i.e. when the patient starts to brux the biofeedback causes the patient to stop sooner than she would without the stimulus. Fewer activations indicate that the patient has learned to anticipate the result of the bruxing activity and therefore avoids initiating it. The results of this study suggest that both processes are at work in equal measure with this treatment method.

An assessment of the reductions achieved by length of treatment indicates that whilst longer treatment periods led to further reductions in bruxing activity, the bulk of the reductions were achieved early in the treatment. Seventeen subjects who had treatment for 5 weeks or less achieved reductions of 62% against a total group reduction of 73%. 6 patients who had treatment for 2 weeks or less achieved reductions in bruxing activity of 70%.

It should be noted that, as with any medical intervention, not all patients may respond to the treatment. Two of the patients (3.5%) achieved reductions of less than 20% in total bruxing activity and may be classed as non-responders. Furthermore, in the case of 6 patients (10.5%) the frequency of bursts increased (although this was accompanied by reduced duration of bursts so that total bruxing activity was lower).

Conclusion

The data indicate that this biofeedback splint significantly reduces the pain and discomfort associated with bruxing and achieves this through a reduction in both the frequency and duration of bruxing incidents, thus reducing the level of stress on the stomatognathic system. bruXane is also effective for patients showing higher levels of bruxing activity.

This biofeedback system works effectively at the subconscious level. Nevertheless, the possibility exists that a small proportion of patients may not respond to the treatment.

Annex 1

The questionnaire completed after the test follows.

Fragebogen nach dem Test

Datum:

Vor- und Nachname des Probanden:

Lieber Proband. Wir danken Ihnen für Ihre Mitwirkung und freuen uns auf Ihr Feedback, etwaige Bemerkungen Ihrerseits, die für uns auch immer wichtig sind, schreiben Sie bitte direkt in das Dokument.

1. Wie stark schätzen Sie aktuell Ihre Beschwerden bzgl. Knirschen/Bruxismus ein?

   (0 = gar nicht; 10 = sehr stark)

2. Hatten Sie in den letzten Tagen /Wochen (in dem Tragezeitraum Ihrer bruXane) mehr/weniger Stress als gewöhnlich?

   mehr ☐ weniger ☐ gleichbleibend ☐ weiß nicht ☐

3. Haben Sie das Gefühl, jetzt weniger zu knirschen?

   Ja ☐ Nein ☐ weiß nicht ☐

4. Wenn Sie bisher eine normale Aufbissschiene getragen haben, haben Sie Verbesserungen von bruXane gegenüber der Aufbissschiene bemerkt?

   Ja ☐ Nein ☐ nicht zutreffend ☐ weiß nicht ☐

   Kommentar:

5. Hatten Sie den Eindruck die Vibration der Schiene hat zu früh eingesetzt, z.B. schon beim Schlucken – oder aber zu spät, Sie mussten zu viel Druck ausüben bis eine Vibration eingesetzt hat?

   zu früh ☐ zu spät ☐ genau richtig ☐ weiß nicht ☐

6. Konnten Sie die Vibration auch als deutliches akustisches Signal hören?

   Ja ☐ Nein ☐ weiß nicht ☐

7. Hat die Vibration oder das akustische Geräusch für Sie im Vordergrund gestanden (was war wichtiger)?

   Vibration ☐ Geräusch ☐ gleich wichtig ☐ weiß nicht ☐

8. Wie empfanden Sie das Tragen von bruXane nach:

   2 Nächten

   2 Wochen

   6 Wochen

   (störend, nicht störend etc.) Falls es am Anfang störend war, wie lange war die Eingewöhnungszeit?

9. Sind Sie nachts durch Ihre bruXane aufgewacht (durch die Vibration/das Geräusch)?

   Ja ☐ Nein ☐ weiß nicht ☐

   Wenn Ja, wie oft ca.:

   Anzahl/Nacht Woche 1

   Anzahl/Nacht Woche 2

   Anzahl/Nacht aktuell

10. Hatten Sie starken Speichelfluss mit bruXane?

    Ja ☐ Nein ☐ weiß nicht ☐

11. Hat dieser im Laufe der Zeit nachgelassen?

    Ja ☐ Nein ☐ weiß nicht ☐

12. Hat Ihre bruXane ausgelöst (vibriert), wenn Sie die Backenzähne aufeinandergepresst haben?

    Ja ☐ Nein ☐ weiß nicht ☐

13. Hat Ihre bruXane ausgelöst, wenn Sie die Vorderzähne gegeneinander geschoben haben?

    Ja ☐ Nein ☐ weiß nicht ☐

14. Wie beurteilen Sie bruXane?

    Skala 0-10 (0 = schlecht; 10 = sehr gut)

15. Würden Sie eine bruXane kaufen (unabhängig vom Preis)?

    Ja ☐ Nein ☐ weiß nicht ☐

16. Feedback (Freitext – bitte beliebig ausfüllen):

17. Bitte beurteilen Sie Ihre aktuellen Symptome, wie es Ihnen **jetzt** geht.

Symptom:	**Bewertung:** von 0 bis 10 (0 = keine; 10 = sehr stark)	**Bitte ankreuzen (x), wann am stärksten**			
		nach dem Aufstehen	während des Tages	abends	weiß nicht
Kopfschmerzen		☐	☐	☐	☐
Migräne		☐	☐	☐	☐
Tinnitus		☐	☐	☐	☐
Verschlechtertes Sehen		☐	☐	☐	☐
Schmerzende Gesichtsmuskeln		☐	☐	☐	☐
Müdigkeit im Kieferbereich		☐	☐	☐	☐
Steifheit beim Bewegen des Kiefers		☐	☐	☐	☐
Reibendes Geräusch im Kiefergelenk		☐	☐	☐	☐
Knacken im Kiefergelenk		☐	☐	☐	☐
Kiefergelenkschmerzen		☐	☐	☐	☐
Unterkiefer blockiert		☐	☐	☐	☐
Schulterschmerzen		☐	☐	☐	☐
Nackenschmerzen		☐	☐	☐	☐
Rückenschmerzen		☐	☐	☐	☐
Sonstiges Symptom, welches Sie dem Knirschen zuordnen:		☐	☐	☐	☐

18. Inwiefern werden die folgenden Aktivitäten durch die o.g. Symptome eingeschränkt oder sogar verhindert? (0 = überhaupt nicht; 10 = extreme Einschränkung)

	Bewertung (0-10)
Kauen	
Trinken	
Allgemeine Körperbewegungen	
Essen von harten Speisen	
Essen von weichen Speisen	
Lächeln	
Reinigung der Zähne oder des Gesichts	
Gähnen	
Schlucken	
Sprechen	
Ein normaler Gesichtsausdruck	