

1 Summary and conclusions

354 persons from the Norwegian company KGH Custom Service, from the Swedish companies Kongsberg Maritime, Ving Travel and Tretton 37 and from the Danish companies Kamstrup, Siemens, Toyota and OK oil participated in the Field Trial. They used the Backapp Chair and the Backapp 360 balance board for 6 weeks. They left their standard office chair at the day the field trial started and only used the Backapp products. All of them had a sit/stand desk from before.

After 6 weeks the participants reported average daily sitting time to 4,4 hours and average daily standing time to 1,1 hours.

Less lower back pain.

Before the trial, 208 participants (58,7%) reported No lower back pain or Very little lower back pain. After 6 weeks the number had increased to 251 (70,9%). The effect was highly significant.

Less pains in the upper body (back, shoulders, neck, head, arms or hands)

During 6 weeks with the Backapp chair and the Backapp 360 balance board, pains in the upper body were reduced significantly. Before the trial 88 persons said that they Never, almost never experienced pains in the upper body. After 6 weeks the number of participants with no pains increased to 145.

Before the trial almost half of the participants – 170 of 354 – had pains in their upper body 2-3 days a week or almost every day. After 6 weeks the number had decreased to 110 (31,1%). It is difficult to concentrate on office work when you have pains in the upper body. The significant reduction in pains in the upper body is expected to increase the overall productivity of office workers.

The participants reported pains in 4 places; lower back, shoulder and neck, head and arms/hands. The results were added together to a pain score of maximum 4 (4 pain areas) Before the trial the participants reported in average 1,79 pains. After 6 weeks with the Backapp products, the number decreased to 1,15. The reduction was as big as 35,4% - highly significant.

- Lower back pain /stiffness every week was reported by 175 of the participants before the trial. Going down to 141 after 6 weeks. A reduction of 19,4%.
- Shoulder and neck pains/stiffness was a weekly problem for 241 of the participants before the trial (68,1%). After 6 weeks on the Backapp products it was 135. A 44% reduction!
- Headaches during or after work went down from 125 participants (35,3%) to 68 participants. A reduction of 45,6%!
- Arm and/or hand pains was a weekly problem for 73 of the participants before the trial. After 6 weeks on the Backapp products they were reduced to 39. A reduction of 46,6%.
- **Person with no pains in their upper body showed the biggest effect. 31 persons had no weekly pains in the upper body before the trial. After 6 weeks it was 89. 2,87 times as many!**

Results from Field Trials in Norway, Sweden and Denmark 2019

Less tired in the end of a normal workday

Before the trial, 101 persons (28,5 %) said that they felt tired every day or quite often in the end of a normal working day. After 6 weeks on the Backapp products, the number had decreased to 61 (17,2%). The effect was significant.

63,3% of the participants wanted to continue to use the Backapp products after the field trial had ended.

What we have learned?

The results show a great potential for improved health and wellness for office workers by using the Backapp products. We were aware of the positive effects on low back pains from the scientific studies. From the results of the field trials, we have learned that most of the office workers have pains in the whole upper body (back, shoulders, neck, head, arms or hands) which can be reduced significantly by using the Backapp products.

The significant reductions in pains in the upper body and the significant reduction in tiredness should increase productivity of office workers

2 Introduction

Field trials were started in order to confirm the results from the scientific studies published in scientific papers (<https://backapp.eu/en/effects/>). Main results compared to sitting in ordinary office chairs are:

- You can sit upright in a Neutral Spine position with less effort
- You exercise your core muscles by sitting
- Low back pain is significantly reduced
- You burn 19% more energy

In order to verify the results by office workers, we started to run Field Trials. A field trial is not a scientific study, but a study in the office environment to prove the effects on office workers. Of course, we use scientific methods to study the effects, but we know that the variation is much bigger than in a scientific study.

We let the participants use the Backapp Chair and the Backapp Balance Board as much as they liked to and felt comfortable with, i.e., they were not told to sit a certain length of time of the day or to stand a certain length of time. Some would stand more and sit less, and some do the opposite. The office chairs used before the trial were removed and stored away during the trial. All participants already had electric sit/stand desks before the trial. The hypothesis was that we should be able to confirm the effects from the scientific studies. We also hoped to see additional effects that were difficult to measure in scientific studies.

3 Materials and methods

3.1 Participants

354 employees from 8 companies in Norway, Sweden and Denmark volunteered to participated in the field trials (Table 1). The 354 persons were 209 women, 144 men and 1 other (Table 2). Average age was 42,3 years (from 21 to 66 years old). The participants were of normal weight and height.

Results from Field Trials in Norway, Sweden and Denmark 2019

Table 1. Participants in the field trials

Company	Location	Business	Participants
KGH Custom Service	Halden, Norway	Custom control	44
Kongsberg Maritime	Kristinehamn, Sweden	Products for ship	62
Ving Thomas Cook Northern Europe	Stockholm, Sweden	Travel call centre	44
Tretton 37	Lund, Sweden	Software development	30
Kamstrup	Skanderborg, Denmark	Measurement systems energy and Water	35
Siemens Gemesa	Ålborg, Denmark	Renewable Energy	57
Toyota	Cobenhagen, Denmark	Cars	25
OK	Århus, Denmark	Energy	57
Sum			354

Table 2. Participants and sex

	No. of participants
Female	209
Male	144
Other	1
Total	354

The participants got a Backapp chair, Backapp wheels and Backapp 360 balance board. Everybody had an electric sit/stand desk long time before the trial started. Before the trial, the participants were sitting on normal office chairs with or without arm rests (Table 3). The normal office chair was removed, and the participants had only the Backapp products to use during the trial.

Table 3. Type of chairs used before the trial

	No. of participants	Percent
Standard office chair with back rest	183	51,7
Standard office chair with back and arm rest	155	43,8
Elevated office stool with foot ring	14	4,0
Perching Stool	2	0,6
Total	354	100

The participants received a brief training session about how to use the products and started from day one to use the products as their only sitting and standing devices. Each participant was free to sit and stand as much as he / she wanted to. Technical follow up and reporting was done by a third-party, an independent research company.

The participants filled in a questionnaire before they started to use the Backapp products. After 6 weeks the participants completed a questionnaire to report effects.

Significant differences were tested by Wilcoxon Signed Ranks Test.

4 Results

4.1 Sitting and standing

After 6 weeks the participants reported number of hours sitting and standing at the workstation per day (Table 4 & 5). Average sitting time was 4,4 hours and average standing time 1,1 hours.

Table 4. Sitting hours at the workstation after 6 weeks:

	No. of participants	Percent
0-2 hours	49	13,8
2-4 hours	99	28,0
4-6 hours	123	34,7
More than 6 hours	83	23,4
Total	354	100

Table 5. Standing hours at the workstation after 6 weeks:

	No. of participants	Percent
0-1 hour	220	62,1
1-2 hours	76	21,5
2-3 hours	36	10,2
3-4 hours	18	5,1
More than 4 hours	4	1,1
Total	354	100

4.2 Less pains in the lower back

Before the trial, 208 participants (58,7%) reported No lower back pain or Very little lower back pain. After 6 weeks the number had increased to 251 (70,9%). The effect was highly significant (Table 6). 12 people had a lot of lower back pain. After 6 weeks it was 9. The results confirmed the results from the scientific studies.

Table 6. Do you experience lower back pain during a normal week?

	Before trial		After 6 weeks		6 weeks – before
	No. of participants	Percent	No. of participants	Percent	No. of participants
No lower back pain	96	27,1	131	37	35
Very little lower back pain	112	31,6	120	33,9	8
Some lower back pain	98	27,7	70	19,8	-28
Quite a bit of lower back pain	36	10,2	24	6,8	-12
A lot of lower back pain	12	3,4	9	2,5	-3
Total	354	100	354	100	

p=0,0001 (highly significant)

Results from Field Trials in Norway, Sweden and Denmark 2019

4.3 Less pains in the upper body

During 6 weeks with the Backapp chair and the Backapp 360 balance board, pains in the upper body was reduced significantly (Table 7 & 8).

We asked: How often do you experience pain in either back, shoulders, neck, head, arms or hands? Before the trial 88 persons or 24,9% said that they Never, almost never experienced pains in the upper body. After 6 weeks the number of participants with no pains increased to 145 or 41% (Table 7).

The number of people having pains in the upper body 2-3 days a week or almost every day were 170 (48%), or nearly ½ of the participants! After 6 weeks number had decreased to 110 (31,1%) (Table 7). It is difficult it is to concentrate on office work when you have pains in the upper body. A reduction in pains in the upper body should increase overall productivity of office workers.

In Table 8 we have reported the sum of different pain scores. Meaning that the participants could make multiple choices and report pains in more than one place. They could report pains in the lower back, shoulder/neck, head and arms/fingers. On average, the participants reported 1,79 pains. After 6 weeks with the Backapp products, the number decreased to 1,15 (Table 8). The reduction was as big as 35,4% - highly significant. Only 30 persons (8,5%) had a pain score of zero before the trial. After 6 weeks this number had increased to 92 (26%) (Table 8).

In Table 9 we have split the pains in Table 8 and report the weekly incidence of each pain. **Lower back pain /stiffness** every week was reported by 175 of the participants before the trial. Going down to 141 after 6 weeks. A reduction of 19,4%.

Shoulder and neck pains/stiffness was a weekly problem for 241 of the participants before the trial (68,1%). After 6 weeks on the Backapp products it was 135. A 44% reduction!

Headaches during or after work went down from 125 participants to 68 participants. A reduction of 45,6%!

Arm and/or hand pains was a weekly problem for 73 of the participants. After 6 weeks on the Backapp products they were reduced to 39. A reduction of 46,6%.

Person with no pains (None of the above) showed the biggest effect. 31 persons had no weekly pains in the upper body before the trial. After 6 weeks it was 89. **2,87 times as many!**

Table 7. How often do you experience pain in either back, shoulders, neck, head, arms or hands?

	Before trial		After 6 weeks		6 weeks – before
	No. of participants	Percent	No. of participants	Percent	No. of participants
Never, almost never	88	24,9	145	41	57
Once a week	96	27,1	99	28	3
2-3 days a week	86	24,3	63	17,8	-23
Almost every day	84	23,7	47	13,3	-37
Total	354	100	354	100	

p=0,0001 (highly significant)

Results from Field Trials in Norway, Sweden and Denmark 2019

Table 8. Which of the following types of pains have you experienced during a normal workweek? Multiple choice.

- Lower back pain/stiffness
- Shoulder and neck pain/stiffness
- Headaches during or after work
- Arm and/or hand pains
- None of the above

	Before trial		After 6 weeks		6 weeks – before No. of participants	Average pains	
	No. of participants	Percent	No. of participants	Percent		Before trail	After 6 weeks
Pain score = 0	30	8,5	92	26	62	0,00	0,00
Pain score = 1	123	34,7	147	41,5	24	0,35	0,42
Pain score = 2	111	31,4	83	23,4	-28	0,63	0,47
Pain score = 3	70	19,8	32	9	-38	0,59	0,27
Pain score = 4	19	5,4	0	0	-19	0,22	0,00
Total/Average	354	100	354	100		1,785	1,153

p=0,0001 (highly significant)

Table 9. Which of the following types of pains have you experienced during a normal workweek?

	Before trial		After 6 weeks		6 weeks - before No. of participants	Change %
	No. of participants	Percent	No. of participants	Percent		
Lower back pain/stiffness	175	49,4	141	39,8	-34	-19,4
Shoulder and neck pain/stiffness	241	68,1	135	38,1	-106	-44,0
Headaches during or after work	125	35,3	68	19,2	-57	-45,6
Arms and/or hand pains	73	20,6	39	11	-34	-46,6
None of the above	31	8,8	89	25,1	58	+287,1

4.4 Less use of pain killers

We asked the participants: How often you do you eat pain killers to reduce pains in the upper body. The answers show a tendency towards reduction in the use of pain killers (p=0,063) (Table 10).

Table 10. How often you do you eat pain killers to reduce those pains?

	Before trial		After 6 weeks		6 weeks – before No. of participants
	No. of participants	Percent	No. of participants	Percent	
Not relevant to me	22	6,2	36	10,2	14
Never, almost never	261	73,7	263	74,3	2
1-2 days during the week	60	16,9	40	11,3	-20
3-4 days during the week	8	2,3	8	2,3	0
5-6 days during the week	2	0,6	3	0,8	1
All week	1	0,3	4	1,1	3
Total	354	100	354	100	

p=0,063 (not significant)

Results from Field Trials in Norway, Sweden and Denmark 2019

4.5 More surplus energy at work

We asked: How often do you feel tired at the end of a normal workday? Before the trial, 101 persons (28,5 %) said that they felt tired every day or quite often. After 6 weeks on the Backapp products, the number had decreased to 61 (17,2%). The effect was significant (Table 11). Less tired = more productivity.

Table 11. How often do you feel tired at the end of a normal workday?

	Before trial		After 6 weeks		6 weeks - before
	No. of participants	Percent	No. of participants	Percent	No. of participants
Never	21	5,9	21	5,9	0
Infrequently	98	27,7	109	30,8	11
Every now and then	134	37,9	163	46	29
Quite often	83	23,4	51	14,4	-32
Frequently/every day	18	5,1	10	2,8	-8
Total	354	100	354	100	

p=0,014(significant)

4.6 Do you want to continue to use the Backapp products?

224 participants - 63,3 % - wanted to continue to use the Backapp products after the 6-week trial.