

Instrumental and clinical study on the efficiency and tolerance of the Fitsonic[®] abdominal belt

*R. Tavassoli M.D., J. Monné M.D.
R. Perillat Dietician, A. Mortal Dietician, J. Ausderau Sports coach.*

Field of study:

Evaluating the Fitsonic[®] machine, an abdominal belt with 24 low-frequency ultrasound wave electrodes used in resonance on fatty tissues to tone the body.

Objective:

Determining the efficiency of the 'Turbocure' treatment (which combines continuous physical activity over 40 minutes with the use of the Fitsonic[®] belt over six sessions) in terms of waistline, waist size reduction and loss of centimetres, without any low-calorie diet.

The hypothesis is that the waistline will diminish after a week's testing with no significant impact on general weight loss.

Methodology:

The device was used once a day (for 40 minutes, five minutes heating at the beginning and at the end of the session and 30 minutes normal use at 100% intensity), while simultaneous physical exercise adapted to each volunteer was carried out (stationary bike, elliptical trainer, treadmill, etc.), over a period of six days in a row by 20 male and female volunteers, healthy, aged between 28 and 67, with localised fat in the stomach and 'love handles'.

After a medical assessment, the experimental procedure consisted in clinical and instrumental measurements being taken at the beginning of the test and seven days later, under the same conditions, to determine the efficiency of the device. The measurements featured:

1. The evaluation of the circumference through centimetric measurements of different body parts
 - ✓ Circumference of the waistline
 - ✓ Abdominal circumference at umbilicus level
 - ✓ Circumference of the hips
2. The evaluation of the BMI (Body Mass Index), which measures the corpulence of an adult by dividing his mass (i.e. weight) in kilogrammes by his height squared, in metres.
3. The evaluation of biometric measurements by bioelectric impedance – Tanita©
 - ✓ Lean mass/fat mass
 - ✓ Level of visceral fat: visceral fat is fat located in the abdominal cavity, which envelops the vital organs in the trunk.

Statistical analysis was carried out to assess the significance of clinical and biometric data.

Other measurements were also carried out, such as:

Self-assessment by the volunteer of the acceptability and tolerance of the device.

Group of volunteers:

20 subjects took part in the study. 8 women (W) and 12 men (M). Only one male volunteer was excluded from

the study because of his missing final assessment. The average age was 50.8 years (34-66) for the women's group and 51.1 (28-67) for the men's. The women's group weighed in between 59.1 and 84.2 kg (average 70.9 kg) with a BMI between 23.1 and 31.8 kg/m² (average 27.15 kg/m²). The men's group weighed in between 69.0 and 90.7 (average 79.5 kg), with a BMI between 23.2 and 31.8 kg/m² (average 26.18 kg/m²). In both groups, we noticed a normal increase in BMI in relation to age, a fact that highlights the good selection of volunteers in both groups (Tables I and II).

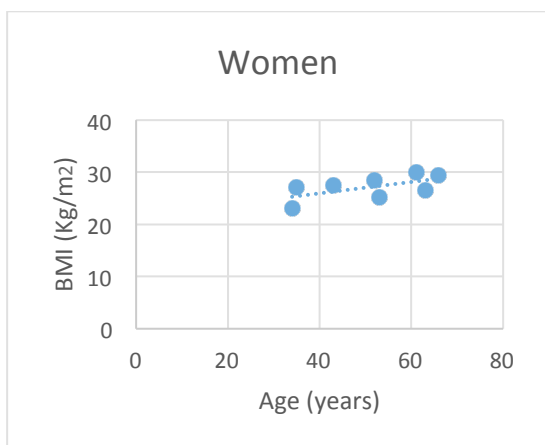


Table I: Relation between age and BMI

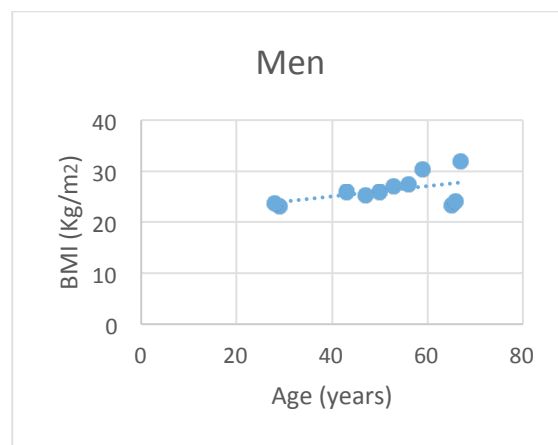


Table II: Relation between age and BMI

Results:

The data collected (Tables III and IV) illustrates slight weight loss (337 g/week in the women's group and 600 g/week in the men's) and more significant variances in the measurement of the circumference of the waistline, the abdomen and the hips. We also noticed variances in fatty mass and visceral fat as measured by bioelectric impedance (Tanita©).

Volunteer No.	1	3	4	7	8	10	11	14
Gender	W	W	W	W	W	W	W	W
Age	43	53	52	35	61	66	63	34
WEIGHT Beginning	72.1	65.9	84.2	65.2	75.1	78.8	67.1	59.1
WEIGHT End	71.9	64.4	83.7	65.1	74.1	78.6	67.9	59.1
VARIANCE Weight	-0.2	-1.5	-0.5	-0.1	-1	-0.2	0.8	0
VARIANCE % Weight	-0.3%	-2.3%	-0.6%	-0.2%	-1.3%	-0.3%	1.2%	0.0%
BMI Beginning	27.5	25.1	28.5	27.1	30.1	29.3	26.5	23.1
Level visc. fat Beginning	7	6	6	4	10	11	8	3
Level visc. fat End	6	6	6	4	9	11	8	3
VARIANCE Visceral fat	-1	0	0	0	-1	0	0	0
VARIANCE % Visceral fat	-14.3%	0.0%	0.0%	0.0%	-10.0%	0.0%	0.0%	0.0%
Waist circumference Beginning	82	78	88	80	85	84	75	73
Waist circumference End	82.5	78	88	79	84	83	75	74
VARIANCE Waist (cm)	0.5	0	0	-1	-1	-1	0	1

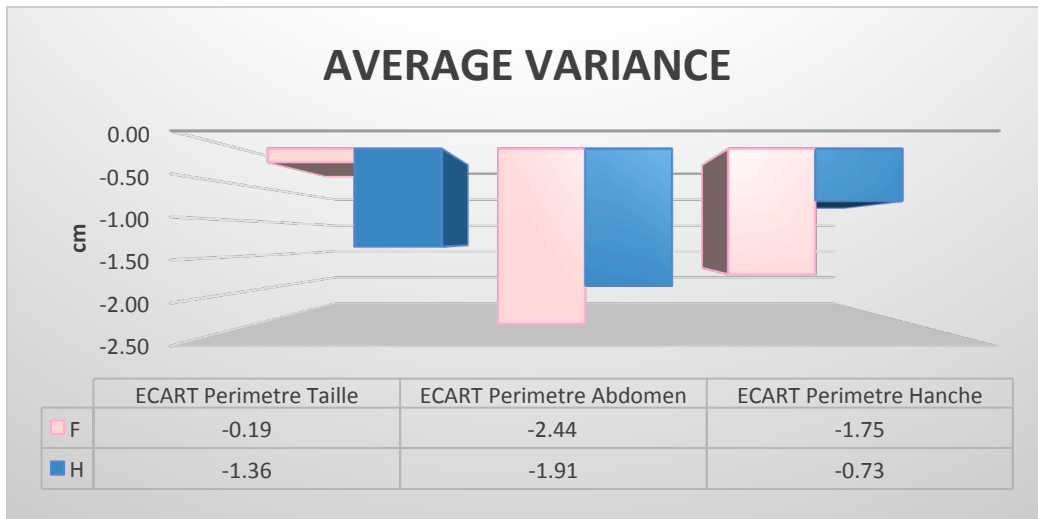
VARIANCE % Waist	0.6%	0.0%	0.0%	-1.3%	-1.2%	-1.2%	0.0%	1.4%
Abdomen circumference Beginning	92	82	103	89	102.5	97	86	84
Abdomen circumference End	89.5	82	99	88.5	99	92	83	83
VARIANCE Abdomen (cm)	-2.5	0	-4	-0.5	-3.5	-5	-3	-1
VARIANCE % Abdomen	-2.7%	0.0%	-3.9%	-0.6%	-3.4%	-5.2%	-3.5%	-1.2%
Hips circumference Beginning	101.5	93	103	90	106	108	97	88
Hips circumference End	97	93	103	89.5	104	102	97	87
VARIANCE hips (cm)	-4.5	0	0	-0.5	-2	-6	0	-1
VARIANCE % hips	-4.4%	0.0%	0.0%	-0.6%	-1.9%	-5.6%	0.0%	-1.1%

Table III: Results for the different female volunteers, at the beginning and at the end of the test

Volunteer No.	2	5	6	9	12	13	15	16	17	18	19
Gender	M	M	M	M	M	M	M	M	M	M	M
Age	50	56	47	59	65	67	66	43	29	53	28
WEIGHT Beginning	83.9	81.3	79.2	82.4	69	90.7	74.8	81.3	71.9	84.5	75.8
WEIGHT End	82.2	81.1	77.6	82.5	69.3	89.8	74.9	80.5	71.2	83.8	75.2
VARIANCE Weight	-1.7	-0.2	-1.6	0.1	0.3	-0.9	0.1	-0.8	-0.7	-0.7	-0.6
VARIANCE % Weight	-2.0%	-0.2%	-2.0%	0.1%	0.4%	-1.0%	0.1%	-1.0%	-1.0%	-0.8%	-0.8%
BMI Beginning	25.9	27.5	25.3	30.3	23.3	31.8	24.1	25.9	23.2	27	23.7
Level visc. fat Beginning	9	12	10	16	10	18	11	9	3	11	3
Level visc. fat End	8	12	10	16	10	17	11	8	3	11	2
VARIANCE visceral fat	-1	0	0	0	0	-1	0	-1	0	0	-1
VARIANCE % visc. fat	-11.1%	0.0%	0.0%	0.0%	0.0%	-5.6%	0.0%	-11.1%	0.0%	0.0%	33.3%
Waist circumference Beginning	91	92	95	104	85	109	85	92	81	95	80
Waist circumference End	89	92	92	100	85	108	85	91	76	95	81
VARIANCE Waist (cm)	-2	0	-3	-4	0	-1	0	-1	-5	0	1
VARIANCE % Waist	-2.2%	0.0%	-3.2%	-3.8%	0.0%	-0.9%	0.0%	-1.1%	-6.2%	0.0%	1.3%
Abdomen circumference Beginning	98	98	101.5	104	88	110	92	96	81	99	85
Abdomen circumference End	91	96	100	104	87.5	106	91	96	80	98	82
VARIANCE Abdomen (cm)	-7	-2	-1.5	0	-0.5	-4	-1	0	-1	-1	-3
VARIANCE % Abdomen	-7.1%	-2.0%	-1.5%	0.0%	-0.6%	-3.6%	-1.1%	0.0%	-1.2%	-1.0%	-3.5%
Hips circumference Beginning	95	98	98	99	96.5	102	87.5	91	87	95	90
Hips circumference End	94	97	98	97	95	102	87	91	86	95	89
VARIANCE hips (cm)	-1	-1	0	-2	-1.5	0	-0.5	0	-1	0	-1
VARIANCE % hips	-1.1%	-1.0%	0.0%	-2.0%	-1.6%	0.0%	-0.6%	0.0%	-1.1%	0.0%	-1.1%

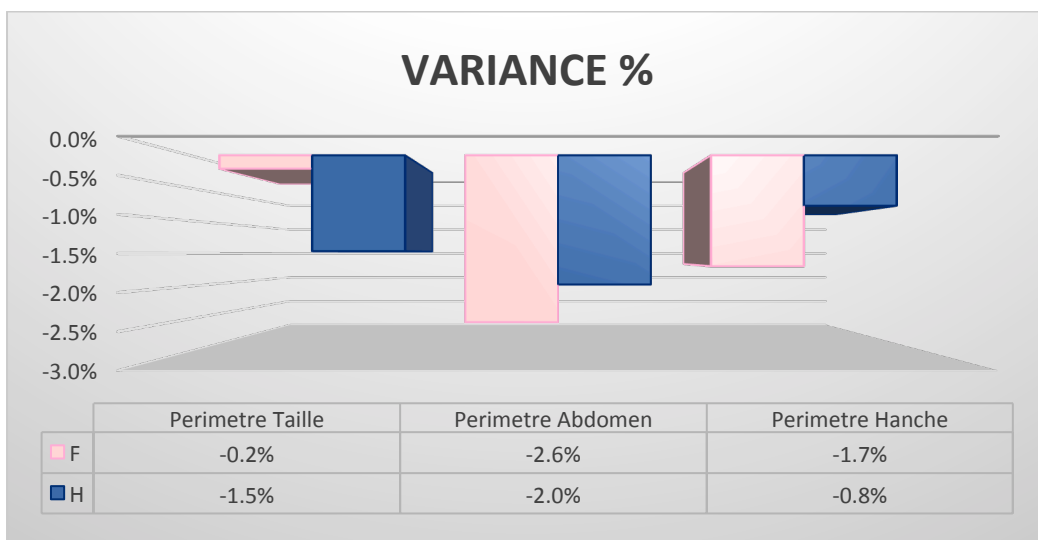
Table IV: Results for the different male volunteers, at the beginning and at the end of the test

From a quantitative point of view, for all subjects, we noticed a reduction (variance between the measurements at the beginning and at the end of the test), of the waistline (-0.2% in the women's group and -1.5% for the men's, which represents an average loss of -0.19 cm in the women's group and -1.36 cm in the men's), of the **circumference** of the abdomen (-2.6% in the women's group and -2.0% in the men's, which represents an average difference of -2.44 cm in the women's group and -1.91 cm in the men's), and of the **circumference** of the hips (-1.7% in the women's group and -0.8% in the men's, which represents an average loss of -1.75 cm in the women's group and -0.73 cm in the men's) (Figures 1 and 2).



VARIANCE Waist Circumference / VARIANCE Abdomen Circumference / VARIANCE Hips Circumference

Figure 1: average variance of the measured **circumference** (in centimetres).

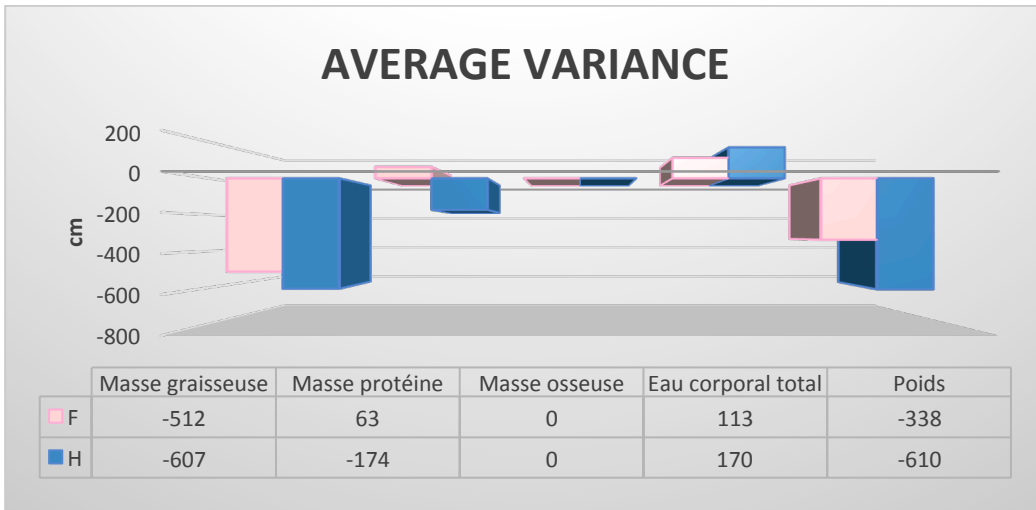


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Figure 2: percentage variance of the measured circumferences.

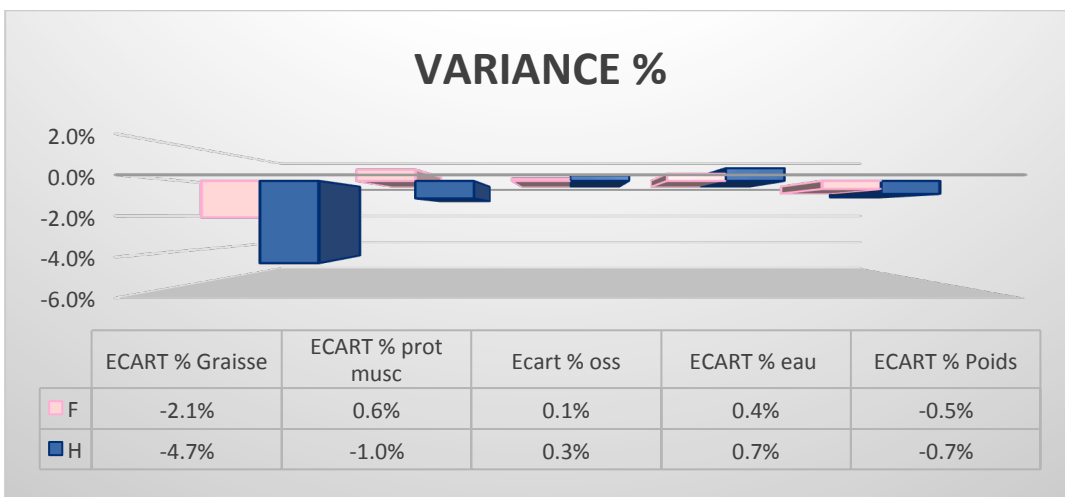
The average loss of visceral fat measured by bio-impedance (Tanita©) is of -3.04% in the women's group and -5.55% in the men's group.

Interestingly, we noticed that, although weight loss was not particularly significant either in the women's group (338 grams) or in the men's (610 grams), almost all of it concerned fatty mass, between 512 grams in the women's group and 607 grams in the men's group on average. This loss of fat after a week represents almost 5% of body fat reduction in the men's group and 2.1% in the women's (Figures 3 and 4).



Grams / Fatty mass / Protein mass / Bone mass / Total body water / Weight

Figure 3: Average variance of body composition values and weight measured in grams with Tanita©



Variance % Fat / Variance & musc. prot. / Variance % bone / Variance % Water / Variance % Weight

Figure 4: Percentage variance of body composition values and weight measured in grams with Tanita ©.

From the point of view of self-assessment, the acceptability was excellent. All volunteers completed the tests, except for one who was excluded because he didn't turn up for the final examination. The tolerance was good. A volunteer who had a double hip implant even subjectively noticed that her pain had slightly abated and that she had taken less anti-inflammatory drugs during the week of testing. Several volunteers noticed some nausea and a tendency towards constipation and all volunteers were bothered by a sound the device emitted, although it was deemed tolerable during the 30 minutes of ultrasound emission.

Discussion:

The purpose of this study was to assess the short-term efficiency of the 'Turbocure' treatment protocol with the Fitsonic® abdominal belt on the reduction of abdominal circumferences. In light of the results, this technique is deemed objectively efficient. Objectively, 62.5% of the three circumferences measured in women and 66.6% of those measured in men were reduced.

We studied this reduction and found no significant differences relating to age or BMI in the men's group. In the women's group, however, the reduction of the circumferences of the abdomen, the waist and the hips, seems greater for older women, i.e. for subjects with higher BMIs in our group of volunteers.

It is also possible that these results relate to the increase in physical activity, i.e. 40 minutes per day. We measured the theoretical calorie consumption during physical activity: between 925 and 1533 Kcal for the women's group (1303 Kcal on average) and between 971 and 2451 Kcal in the men's group, with an average consumption of 1526 Kcal in total for 6x40 minutes spent on the stationary bike, the elliptical trainer and the treadmill. As expected, calorie consumption is inversely proportional to the BMI, i.e. subjects with a lower BMI (younger subjects) burned more calories during physical activity (Tables V and VI).

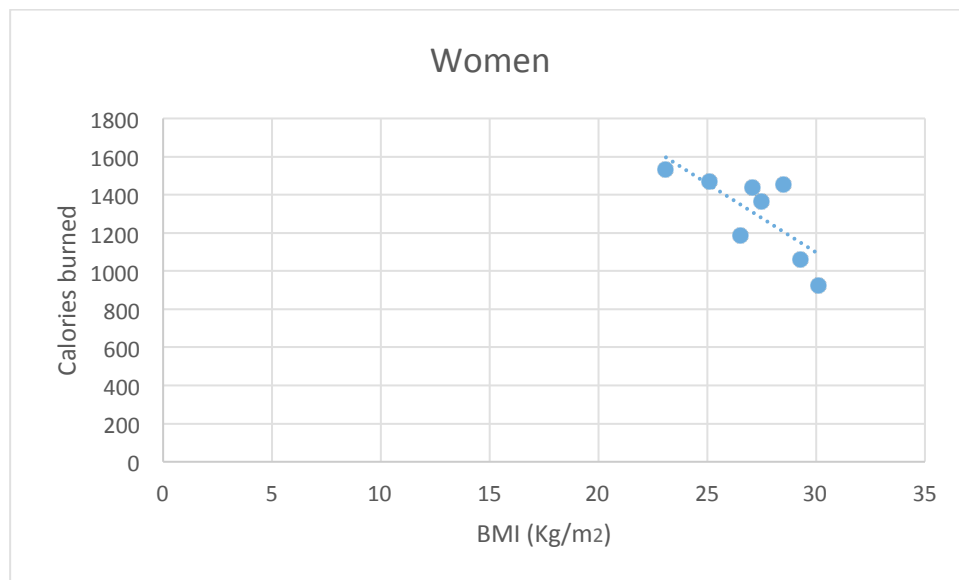


Table V: Relation between BMI and calorie consumption

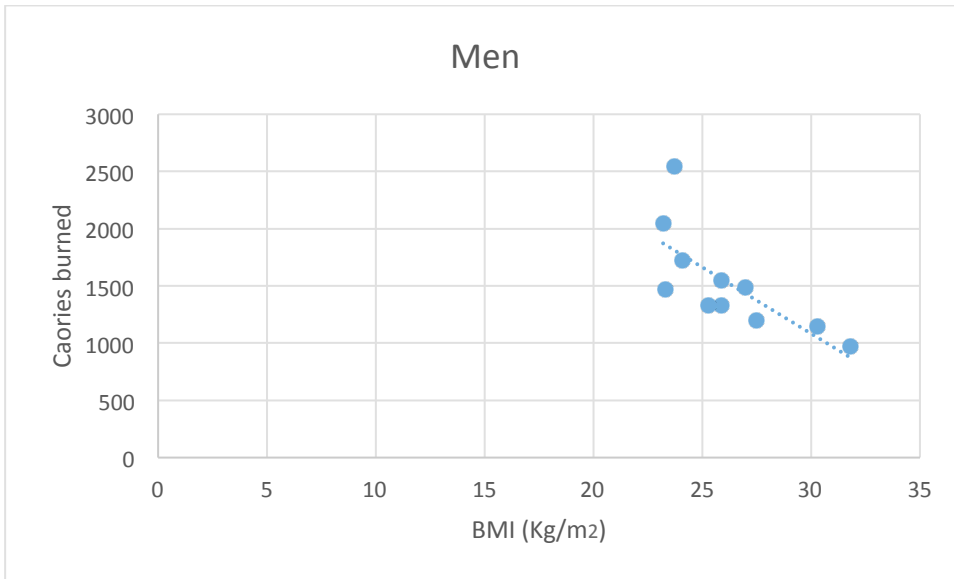


Table VI: Relation between BMI and calorie consumption

However, it is odd to notice in the women’s group that reduction of the abdominal circumference, the most significant result in the three measured circumferences, is greater for volunteers who burned less calories while doing physical activity (Table VII), i.e. older subjects with a higher BMI. We found no relation between the total calories burned during physical activity and the variance of abdominal circumference in the men’s group (Table VIII). Therefore, it seems that the physical activity included in the ‘Turbocure’ treatment protocol with the Fitsonic® abdominal belt is not solely responsible for the reduction of the measured circumferences.

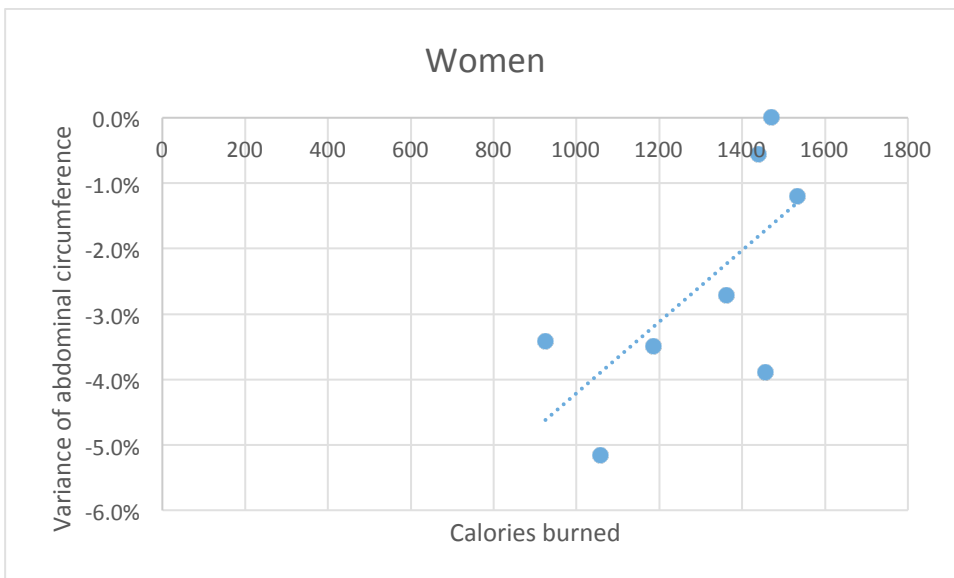


Table VII: Relation between calorie consumption and the variance of the abdominal circumference



Table VIII: Relation between calorie consumption and the variance of the abdominal circumference

The study's results illustrate the efficiency of the technique and confirm the premise on which it is based. Indeed, the premise was that reduction of the abdominal circumference happens thanks to the combined effects of the 'Turbocure' treatment protocol, over 6 days, and the Fitsonic® abdominal belt, which includes 40 minutes of physical activity, while eating normally, with no low-fat diet. Results show a significant reduction of the measured circumferences, as well as a reduction of visceral fat, and the slight weight loss was due to a loss of body fat in over 50% of the volunteers.

It should be noted that the effects of the described protocol generated a high rate of compliance and motivation in the volunteers.

Conclusion:

This study objectively shows the efficiency of the 'Turbocure' treatment protocol with the Fitsonic® abdominal belt over a week to reduce the abdominal circumferences, especially the abdominal circumference measured at umbilicus level. However, a study with a control group should be carried out in order to assess its long-term efficiency and to determine the parameters that could optimize the treatment (age, total duration of the treatment, efficiency of the device with or without physical activity, etc.).

Finally, an in-depth examination of the underlying pathophysiological mechanisms, which could explain the efficiency of the Fitsonic® belt low-frequency ultrasound used in resonance, would be worthwhile.

References:

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