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SADDLE CHAIR

The present invention relates to a saddle chair which comprises a seat which has a rounded center part and side parts which at least partially curve downwards at an angle from the center part in order to support the pelvis and thigh muscles of the seated person, said side parts having front edges which are at diagonal angles to one another and between them is formed a space.

When sitting on current chairs and conventional saddle chairs there is the problem that there is pressure put on the groin and pelvic area and the temperature in those areas increases. When sitting in upholstered chairs, air circulation in the pants is bad and the temperature of the testes increases. The use of a belt and keeping the belt tight puts pressure on the stomach and pelvic muscles. Particularly the concentration of excess weight around the waist forces the belt to be drawn tight so that the pants stay in place. Air circulation inside the pants becomes worse and accelerates the accumulation of body heat in the groin area. However, the temperature in which sperm are normally produced is some degrees lower than the temperature of the body system.

If excess heat is continually present in this area, the situation can lead to diminished sperm production. Research has shown that the quality of sperm has an effect on fertility. Between the years 1940 and 1990, the quantity of sperm has decreased and the quality has become worse, particularly in western countries. When surveying reproductive health, a population study showed that there has been nearly a 50% decrease in men's sperm count the world over in the last 50 years. In the 1940's there were 114 million spermatozoa counted in a milliliter of sperm, while in the 1990's, 66 million spermatozoa have been counted. This report was compiled from 61 studies and it covers nearly 1500 men in 20 different countries. The decrease in the quantity of spermatozoa can be explained by the chemical conversion in the environment. A second possibility is that a way of life given to prolonged periods of sitting has caused the temperature in the groin



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area to rise, thereby creating disadvantageous conditions for sperm production. Pants which are secured with a tightened belt do not allow the body heat to escape from the pants, so that the temperature of the testes is able to rise to an above normal temperature. It has been found that disabled males using wheel chairs have a higher testes temperature than that of the healthy male test subjects. It is known that clothes which are too tight can reduce male fertility. Furthermore, it has been found that hot air decreases the quality of sperm.

According to literature, no research has ever been done on the influences that different types of chairs or the use of a belt that restricts the air circulation have on the temperature of the testes. With the support and locomotory system, at its worst, sitting can cause problems in extremities, the back and neck and shoulder region. Nowadays, the working environment is such that a person must continuously be sitting and remain sedentary for prolonged periods of time. Nonetheless, the structure of our system has remained at the same stage it was in during the Stone Age. It is characteristic of a locomotory system to adapt to the effects of stress. The influencing forces can be internal or external forces (most importantly, gravity or the weight of external burdens) which have been built up by the muscles. The most commonly used chairs require that a person remain motionless. Immobility reduces the part that muscle activity contributes to the blood circulation. This affects the supply of nutrients and oxygen to the body tissue.

The present invention seeks to provide a chair which will eliminate the disadvantages associated with present-day chairs or seats. In particular, the invention seeks to provide a saddle chair which eliminates customary health and work productivity related problems which result from a seat or chair being used. Further, the invention seeks to provide a saddle chair which supports the seated person in a natural way which allows for increased air circulation in the inner thigh and pelvic area and which, when used, prevents the temperature of the testes from reaching as high a temperature as when common

conventional seats are used.

The object of the invention is accomplished with a saddle chair, the characteristics of which are set forth in the patent claims.

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The center front edge section of the seat of a saddle chair formed in accordance with the invention is curved at an angle extending backwards towards the center part of the seat in order to form a space in between the edges which also extends backwards. A space like this fits to the form of the thigh and extends upwards close to the pelvic bone of the seated person. The space produces an increase in air circulation in the inner thigh and pelvic area of the seated person, which cools the tissue in that particular area and cools down male testes and reduces their temperature.

The saddle chair has been structured and intended to bring about a natural and healthy way of sitting. The seat part of the chair guides the seated person to sit with the thighs at an approximate 45° angle downwards and forward at an angle, which helps to keep the pelvis in a straight relaxed position and creates an important hollow at the base of the spine for the benefit of the back. A person sitting on the seat can sit balanced, upright and straight without back support. The side parts support the thighs in a kind of trough shaped for the thighs and the side parts are formed such that they are fitted to the contours of the thighs. The saddle chair supports the thighs along the length of the side parts in the direction of the thighs from the supporting point of the seat bone downwards.

In one advantageous application of the invention, the upper part of the space of the saddle chair is rounded. This structure is pleasant and supports the seated person.

The invention will now be described in more detail with reference to the accompanying drawing in which

Figure 1 illustrates a certain application of a seat part of a saddle chair formed in

accordance with the invention, as viewed from the front,

Figure 2 illustrates a seat part formed in accordance with Figure 1 as viewed from above,

Figure 3 illustrates a seat part formed in accordance with Figure 1 as viewed from underneath the seat, and

- 5 Figure 4 illustrates a seat part formed in accordance with Figures 1-3 as viewed from the side and a cross-section along the central line A-A according to Figure 2.

Furthermore, Figures 5 and 6 illustrate the results of the performed study and for explanations of the study, it is necessary to refer to the appropriate texts.

- 10 Figures 1-4 illustrate the seat part 1 of the saddle chair. The seat part 1 has a rounded center part 2 and side parts 3 which curve downwards at an angle from the center part. The front edges 4 of the side parts are at an angle to one another and they come together at the center part. The front edges 4, located in the front center section of the seat part, are curved outwards and simultaneously at an angle backwards towards the center part
- 15 of the seat. A space is thus formed in between these edges, which extends essentially backwards in relation to the outer front edge of the seat. The space 5 is shaped such that it fits the leg space between the thighs. The upper part of the space 6 at the meeting point of the front edges is rounded. Likewise, all of the edges of the seat part are rounded.

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Naturally, when used the seat part is attached as such in a conventional way to the leg/foot, base or other corresponding part of the saddle chair, however the leg/foot part or the attachment to it are not essential, nor is the leg/foot part presented here. A seat part formed in accordance with the figures is attached to the leg/foot part so that the

25 elevation is adjustable and Figure 1 illustrates an adjusting device 7 by which the seat elevation can be adjusted in a conventional way.

The shape of the seat part of the saddle chair follows the structure of the human pelvis in the form of a saddle, such that the outer edge of the chair follows the contour of the

buttocks of a medium-sized person. Viewed from the side, the seat part is primarily saddle-shaped and when viewed from above it appears roundish, with the exception of the space in the front part of the seat. In this application, the seat part of the saddle chair supports the thighs approximately 25-30 cm in the direction of the thighs descending from the supporting point of the seat bone. The side parts or thigh troughs are formed to sit against the inner surface of the thighs so that the front edges of the chair form aileron-like supports which partially raise the thighs to the front towards the inner surface of the thighs and thus prevent the person sitting on the chair from moving forward. At the same time, the structure of the seat part supports the seated person naturally and makes sitting pleasant. Furthermore, air is able to circulate in the inner thigh and pelvic area better than is otherwise the case.

The frame of the seat part of the saddle chair, the cushioning and upholstery materials are materials which are suitable for the purpose, and in this application, the frame is steel and the upholstery is leather. The cushioning material in the seat is a relatively thin padding material. In the application, there is only approximately 45 mm of padding beneath the seat bones, so that in this way the seat bones (the seat nodes being a part of the pelvic bones) are well supported by the frame. This prevents any concentration of pressure on the buttocks and thighs which retains the circulation of fluid to the lower extremities. The thickness of the padding material may vary in different applications.

COMPARATIVE RESEARCH

A seat formed in accordance with the invention was tested and compared with other seats. The purpose of the study was:

1. To determine by means of objective measurements, whether there is a difference in the seats of a padded office chair, an unpadded one, wooden bench, saddle chair, a knee support chair and sofa (with soft cloth upholstery) with respect to the skin temperature

of the testes and the moisture in that area.

2. To determine the effect of shoulder straps (suspenders/braces) and belts on the skin temperature of the testes and on the moisture in that area

3. To determine whether body mass index has an effect on these.

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The study was done on eight (8) men who volunteered to participate. At the time of the study, the average age of the men was 42 (21-59) years. The anthropometric figures are shown in Table 1.

10 Table 1: The age of the men and the mean anthropometric measurements, minimum and maximum values.

	N	Min.	Max.	Mean value
15 Age=years	8	21	59	42.75
Height cm.	8	169.0	184.0	174.90
Weight kg	8	58.0	97.0	72.81
WHR=waist/hip ratio	8	.86	1.06	.93
BMI= weight(kg)/height(m) ²	8	18.90	28.60	23.69
20 N	8			

Temperature measurements

25 In the beginning of the study, the average temperature and moisture measurements of the test subjects' testes were taken during a 40 minute period in a cold room. In the beginning of the measuring period, the subjects stood for 5 minutes with their legs slightly astride. This was followed by a 30 minute measuring interval during which the subjects sat on the chair being tested. At the end of the measuring period the subjects stood for 5 minutes with their legs slightly astride. Temperature sensors were attached

to both testes and the comparative body temperature was taken from the armpit. The surface moisture of the right testis was measured using one moisture sensor. The temperature of the room and humidity in the room were measured in connection with each measurement. Temperature and moisture measurements were taken with a portable
 5 battery-operated measuring device which did not interfere with the sedentary work (SQ 1021 Grant Instruments Ltd. Barrington, England). During the measuring period, the test subjects were wearing clothes made from the same material: underpants (briefs) (100% cotton, Boston, USA), trousers (Turo Tailor Oy Ab, Kuopio, Finland) and shirts (Petrifan classic, Petritex Oy, Kuopio, Finland) and socks.

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In connection with the temperature study, measurements of the test subjects' (height, weight, mass index=BMI, waist/hip ratio=WHR) were taken and the subjects were asked about the symptoms of their locomotory system and their physical exercise practices. The tests were done in a heated chamber (23°C) in which the air's relative humidity was
 15 28%. The test subjects were reading during the measuring period.

Six different chairs were compared in the study.

1. Padded chair (Logic 2, Martela Oy, Helsinki, Finland)
- 20 2. Unpadded chair (plywood c. 481, Isku, Lahti, Finland)
3. Wooden bench (Pedihealth Oy, Oulu, Finland)
4. Saddle chair (Salli saddle chair, Easydoing Oy, Rautalampi, Finland). The position assumed on the chair is reminiscent of the sitting position on a horse. When sitting on the saddle chair, the test subject has approximately a 135 degree angle between the thighs
 25 and body, in other words, the legs are nearly straight.
5. Knee support chair (Stokke, Oslo, Norway)
6. Sofa chair (soft, cloth-upholstered, Isku, Lahti, Finland)

RESULTS

Skin temperature of the testes in the six different chairs

Table 2 and Figure 5 illustrate the average skin temperatures of the testes after 30 minutes in each of the six chairs while a belt was being worn. The results show that the temperature was lowest in the saddle chair (chair 4). The difference in temperature is statistically significant compared to the other chairs. Also when suspenders were used, the saddle chair yielded the lowest testes temperature. (Table 3 and Figure 6). The difference is statistically significant compared to all the other chairs. The difference in temperature between the unpadded chair, number 2, and chairs 5 and 6 is also statistically significant. There was no statistically significant difference between the two measures in testes temperatures taken in the same chair, once with a belt and once with suspenders.

Table 2. Skin temperature of the testes, minimum and maximum values in the six different chairs, subjects wearing belts.

Chair	N	Min.	Max.	Mean
1	8	32.85	36.67	34.27
2	8	32.52	35.36	33.79
3	8	32.48	35.58	34.07
4	8	31.10	34.65	32.93
5	8	32.94	36.06	34.54
6	8	32.69	36.09	34.47
N	8			

Table 3. Skin temperature of the testes, minimum and maximum values in the six different chairs, subjects wearing suspenders.

Chair	N	Min.	Max.	Mean
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	1	8	32.70	36.38	34.13
	2	8	32.54	35.87	33.74
	3	8	32.53	35.90	34.17
	4	8	31.03	34.63	32.81
5	5	8	33.30	35.89	34.46
	6	8	33.16	36.43	34.61
	N	8			

Moisture

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Tables 4 and 5 show the average, minimum and maximum skin moisture values of the right testis. The average moisture measurement of the groin, while subjects were wearing suspenders, was lowest in the saddle chair. Compared to the other chairs, the average moisture measurement in the groin area was also lowest in the saddle chair while the subjects were wearing belts. In the saddle chair, the moisture percentage with suspenders was 51, and with a belt 55 percent. The highest moisture percentage in the groin area was measured in chair 5. The average moisture value in the groin area did not have a statistically significant difference with a level of significance of 0.05 with regard to the chairs and use of the belt or suspenders.

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Table 4. The average, minimum and maximum skin surface moisture values of the right testis, taken in six different chairs, subjects wearing belts.

	Chair	N	Min.	Max.	Mean
25	1	8	17.30	96.05	61.49
	2	8	26.00	82.20	60.37
	3	8	29.55	86.55	65.62
	4	8	19.80	81.50	55.33
	5	8	24.85	88.55	67.81

6	8	23.95	89.70	66.68
N	8			

Table 5. The average, minimum and maximum skin surface moisture values of the right
5 testis, taken in six different chairs, subjects wearing suspenders.

	Chair	N	Min.	Max.	Mean
	1	8	23.65	86.35	60.20
	2	8	29.35	88.65	63.82
10	3	8	23.10	91.90	65.26
	4	8	19.95	78.55	50.75
	5	8	21.75	92.15	67.20
	6	8	20.90	93.40	58.65
	N	8			

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Examination of the results

The study indicates that when men sit in the saddle chair, their testes skin temperature is lower than when they sit in the other chairs tested. The moisture in the testes area was
20 also lower in the saddle chair. These study results support Brindley's (1982) research observations that when men sit with their legs nearly together on a soft chair, the temperature of the testes rises and thus sperm production decreases. The effect of the waist-hip ratio and body mass index on the temperature of the testes indicates that overweight men have a higher testes temperature than men who are at the right weight,
25 but there is not enough data to make this comparison. These results may arise from the fact that the air circulation in the pants was bad, or the excess body mass or fat restricts the testes so that air and blood circulation become weaker (or the testes are pressed too close to the stomach and thighs). With padded chairs, the testes temperature is higher than with unpadded chairs. There was no difference in the temperature of the testes

when suspenders were used, as opposed to a belt. Suspenders had a slight effect on the moisture in the groin area. With the saddle chair there was no difference between measures taken with suspenders and measures taken with a belt.

5 Conclusion

1. There are distinct differences in the temperature of men's testes area when they sit on different chairs. Testes temperatures taken in the saddle chair (chair number 4) were the lowest. The highest temperatures were measured in the knee support chair and sofa, that is to say chair numbers five and six. The saddle chair also yielded the lowest measurements in moisture. This being the case, a seat part of a chair formed in accordance with the invention can affect a significant change in the temperature in the pelvic area of the seated person, and in men in the temperature of the testes.
2. Use of suspenders or a belt did not have any significant influence on the skin temperature or moisture of the testes. With suspenders, lower temperatures were attained to some extent in chairs 1, 2, 4 and 5. The relative moisture in the groin area was lower with suspenders in all of the chairs except for chair number 2.

The invention is not limited to the advantageous application set forth in this patent application. The invention is versatile and its form may vary within the frames of the idea of the invention put forth in the patent claims.

CLAIMS

1. A saddle chair which comprises a saddle-shaped seat (1) which has a rounded centre part (2) and side parts (3), which at least partially curve downwards at an angle from the centre part in order to support the pelvis and thigh muscles of the seated person, said side parts (3) having front edges (4) which are at a diagonal angle to one another and between them is formed a space (5), *characterized* in that the front edges (4) located in the front centre section of the seat are curved at an angle backwards and towards the centre part of the seat and the space (5) between these edges extends backwards.
2. A saddle chair in accordance with claim 1, *characterized* in that the upper part (6) of the space (5) is rounded.
3. A saddle chair in accordance with claim 1 or 2, *characterized* in that the saddle chair comprises an adjusting device (7) and the seat is attached to the leg foot part adjustable in height direction with the help of the adjusting device.
4. A saddle chair in accordance with any one of claims 1-3, *characterized* in that all the edges of the seat part are rounded.
5. A saddle chair in accordance with any one of claims 1-4, *characterized* in that the front edges of the seat form aileron-like supports.