

Seasickness Study

Options for a non-pharmacological treatment method

On the effect of oscillatory* vibrations in combating seasickness

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Problem statement

Seasickness (kinetosis) refers to all human reactions to unfamiliar movements and accelerations, especially on ships. Seasickness or travel sickness can affect anyone; in about 90% of cases the symptoms disappear after two to three days. Simple tips often help prevent kinetosis.

The use of medication, especially for prevention, is controversial among experts - not least because of sometimes considerable side effects.

Seasickness has been studied in a differentiated way because of the many thousands of victims in the navy. The exact mechanism of action is still unknown today.

However, it has something to do with contradictory information sent to the brain by the eye and the vestibular organ and with the evaluation of that information, as well as with increased sensitivity of the vestibular organ (statistically, Asians are affected more often) and unfavorable conditions such as fear and stomach contents, alcohol consumption during the journey and also on the evening before, smoking, lack of sleep, stress caused by conflicts on board, or physical complaints such as heat, cold, influenza, or menstruation.

To investigate the physiological processes involved in seasickness, simulators for inducing seasickness are used, for example, at the Hershey Medical Center in Pennsylvania. After investigating the adaptive reactions during the onset and course of seasickness, the research group is attempting to alleviate the unpleasant symptoms of seasickness using Far Eastern acupuncture and acupressure methods.

Research approaches

In addition to the extensive efforts of the pharmaceutical industry to occupy the travel sickness market with products, more and more voices are advocating that seasickness or travel sickness should be alleviated, if not prevented, not by medication but through targeted preparatory therapy and behavioral recommendations. This also includes methods for targeted irritation* of bodily sensors.

Pain, pressure, and position sensors can be desensitized* after short-term irritation*.

Oscillation* or vibration application* has proven to be an effective method. High-frequency vibrations can be delivered to the human body for a few minutes both in a standing form (Human Mobility) and in a lying form (hhp oscillation massage*).

At frequencies above 25 hertz, the body's own sensors are overloaded with an immense stimulus density (overload), so that even immediate pain resistance sets in. Experiments with healthy male adult volunteers showed the effectiveness of prior oscillation treatment* on resistance to the mechanisms that trigger seasickness.

Seasickness or travel sickness can affect anyone.

Methodology

Eighty-six healthy student volunteers participated in this study as subjects. They were divided into 3 subgroups. Group 1 served as the control group and received no desensitization* applications. Group 2 was desensitized* over a total duration of 10 days with daily 15-minute oscillations* in a standing position using a device from Human Mobility. Group 3 received the daily desensitization* applications with the help of the hhp oscillation couch* in a lying position.

At the beginning and at the end of the 10-day experiment, all participants in the three different groups visited a simulator room / drum (based on the investigations of the Hershey Medical Center, Pennsylvania) to induce the symptoms of seasickness.

Immediately after the simulator induced the symptoms of seasickness, physiological parameters were measured and a well-being questionnaire was completed.

The direct inferential-statistical* comparison of the three subgroups was carried out using analysis of variance and was based on the difference values calculated from the before/after comparison.

Study object: the massage couch.

The physiological parameters such as heart rate, blood pressure, coordination ability, and skin temperature were checked by a medical-technical assistant and monitored by a physician.

The well-being questionnaire recorded the subjects' subjective reactions regarding fatigue, weakness, nausea, dizziness, and retching at interval scale level using a visual analogue scale. The results of the retest after completion of the 10-day desensitization phase* were entered without knowledge of the values from the first test.

Presentation of results

Physiological parameters

While the control group without desensitization* showed nearly unchanged values for the symptoms after inducing seasickness in the second examination as well, the physiological parameters in both groups with desensitization* by the oscillation* method changed positively and significantly.

The strong increase in heart rate and blood pressure when seasickness was induced could be clearly mitigated. This is shown by the reduction in mean heart rates in groups 2 and 3 by 19.3 and 18.7 beats per minute respectively (Fig. 1). The same applies to the rise in blood pressure (Fig. 2), which, after desensitization*, was markedly lower in group 2 at -42.7 and in group 3 at -39.8.

Fig. 1: Changes in mean heart rate after a 10-day desensitization phase* using the oscillation* method.

| Group | Heart rate |
|---------------|------------|
| Control group | 5.8 |
| Group 2 | -19.3 |
| Group 3 | -18.7 |

Fig. 2: Changes in mean blood pressure values after a 10-day desensitization phase* using the oscillation* method.

| Group | Blood pressure |
|---------------|----------------|
| Control group | 12.3 |
| Group 2 | -42.7 |
| Group 3 | -39.8 |

Coordination and subjective well-being

While the control group shows no difference in coordination ability, both treatment groups show significant improvements in test performance. The desensitization phase* with oscillatory* applications in lying and standing positions leads to clear resistance to the symptom of weakened coordination ability in seasickness.

The results for subjective well-being, such as fatigue, weakness, nausea, dizziness, and retching, were less pronounced. Only minor changes below the significance threshold* could be recorded here.

Fig. 3: Changes in values achieved in the coordination test after a 10-day desensitization phase* using the oscillation* method.

| Group | Coordination |
|---------------|--------------|
| Control group | 0.8 |
| Group 2 | 24.7 |
| Group 3 | 23.8 |

Summary

The results available so far on desensitization* of seasickness with vibration massages are quite encouraging with respect to physiological parameters, although no dominance of either of the two competing methods is currently evident. Standing as well as lying vibrations obviously appear to be helpful in combating seasickness. For desensitization*, timely application of these treatment methods shortly before the start of travel is also important.

When symptoms of seasickness are present (see control group), lying vibration massage shows greater user benefit than standing vibration massage. In a follow-up study, members of the control group showed a significantly* greater reduction in the complaint profile in a shorter time when they were oscillated by the hhp massage couch. This supports the direct use of the massage couch when seasickness occurs.

Also for home use or even use on board, the foldable hhp massage couch appears more advantageous than the heavier Human Mobility device, which is very difficult to stow on board because of its dimensions. However, further extensive studies are needed to get to the bottom of the phenomenon of seasickness and ways of combating it.

Fig. 4: Reduction of the symptom of nausea due to different oscillations*.

| Group | Nausea |
|----------|--------|
| Standing | -14.9 |
| Lying | -24.1 |

Explanatory notes

- Oscillation massage / oscillating massage - massage with generated vibrations.
- Irritation - misleading or targeted stimulation of a sensor.
- Desensitization - a procedure for reducing sensory reactions.
- Oscillation or vibration application - use of the therapeutic method with vibrations.
- Inferential-statistical - a statistical testing procedure.
- Significance threshold - threshold value for accepting a statement.
- Significant - clear, non-random.