“Does daylight have an effect on perioperative pain sensation?”

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Background. Preliminary studies indicate a significant connection between the exposition to daylight and pain sensation in humans. Furthermore, the influence of dynamic changes of light in its variant manifestations on human has given rise to several therapeutic attempts. Despite this, the question of daylight intensity and its impact on physical, emotional and mental perception of acute pain remains open. Therefore, we aimed to characterize the potential impact of light intensity on patients' pain sensation in the perioperative setting.

Material and methods. In the context of the prospective German multicenter registry QUIPS, we investigated the effects of light intensity on postoperative pain sensation. We collected the patients' outcome concerning pain and side effects, demographics, perioperative pain medication and measured the light intensity in their room on the first postoperative day. The study aimed to characterize the potential impact of light intensity on patients' pain sensation in the perioperative setting. The project was approved by the Ethics Committee as well as the Data Security Board of Jena University Hospital, Jena, Germany, and all participating sites obtained approval from their respective Ethics Committees.

The primary endpoint was maximal pain rated on the numerical rating scale (NRS) of 0 to 10 (0= no pain, 10 = worst pain imaginable). The secondary endpoints were side effects such as pain on movement, nausea and tiredness.

Table 1. Summary of demographic frequency distribution of age (mean = 58 years), ASA state and gender

Age	Median: 58 yrs	Q25/75: 55/75 yrs
Gender	54,7 % w	44,3 % m
ASA 1	16,3 %	88 (n)
ASA2	50,3 %	271 (n)
ASA3	27,5 %	148 (n)

Results. In total, the data of 539 surgical patients of nine hospitals was collected from August 2015 to September 2016. For the primary endpoint maximal pain as well as for the secondary endpoints of pain on movement, contentment and tiredness, no significant effect of light intensity was found. Besides, a strong positive correlation between nausea and light intensity ($\text{Exp (B)} = 2,63$ $p < 0.05$, CI: 1,62 - 4,26) could be observed. As seen in other studies, gender influences the outcome maximal pain ($p = 0,005$), nausea ($p = 0,00$ CI: 2,19 - 6,08) and tiredness ($p = 0,00$ CI: 1,96 - 4,19) while age influences the outcomes maximal pain ($p = 0,00$) and pain on movement ($p = 0,00$ CI: 0,96 - 0,990).

Table 2. For the dependent variable nausea a significant positive correlation with logarithmized light intensity values ($p < 0,05$, Exp (B) : 2,628) as well as female gender ($p < 0,05$, Exp (B) : 3,649) was shown.

	Regression coefficient	Standard error	Sig.	Exp (B)
Logarithmic light intensity	0,966	0,246	0,000	2,628
gender	1,294	0,260	0,00	3,649
age	-0,03	0,009	0,713	0,997
chronic pain	-0,371	0,251	0,140	0,690
asa state	0,165	0,207	0,424	1,180
constant	-4,735	0,856	0,000	0,009

Table 3. Summary of statistical calculation for dependent variable maximal pain. Significant b-coefficient resulted for the values age and gender. For logarithmized light intensity no significant connection was shown.

modell	Coefficients not standardized		Standardized coefficients	Sign.
	Regression coefficient	standard error	Beta	
constant	9,647	0,826		0,000
age	-0,052	0,009	-0,306	0,000
gender	-0,693	0,243	-0,125	0,005
log_light intensity	-0,094	0,250	-0,17	0,707
chronical pain	0,302	0,257	0,055	0,241
asa status	0,096	0,271	0,024	0,657

Conclusion. No connection of light intensity and maximal pain values was found. Instead, the data show a strong positive association of light intensity and the secondary endpoint nausea. **The probability of a patient suffering from nausea rises by a factor of 2,6 per logarithmic light intensity value.** Whereas contradictory influence of light on headache and migraine has already been evaluated, no former efforts have been made to discover a link between light and nausea in general. The clinical importance of day light exposure on the side effect nausea in the postoperative setting has to be analyzed in further studies.