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Does automotive window films affect driver's safety by decreasing vision sensitivity? a cross-sectional study

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Introduction: Automotive window films have been developed to bring thermic comfort, UV protection, privacy and security to drivers and passengers, but how much of the driver's vision is affected by these films is not well documented.

Purpose: The purpose of this study is to measure visual acuity in high and low contrast sensitivities in different grades of visible light transmission (VLT) films in three different positions (front, lateral and rear windows).

Methodology: Forty four healthy volunteers between 30-75 years-old, with BCVA (Best Corrected Visual Acuity) of no less than 0.5. Their vision were tested outside and inside 5 different vehicles with window films of a specific VLT. Vehicle 1 (Default) was considered the automotive with VLT of 75% in the front window and 70% in lateral and rear windows. Vehicle 2 (Legal in Brazil), had front and lateral windows with VLT of 70% and rear with 28%; Vehicle 3 (Illegal), had front window with 70%, lateral with 28% and rear with 15%; Vehicle 4 (Illegal) had 35% in all 3 windows and Vehicle 5 (Illegal) 50% in the front, 20% in the lateral and 15% in the rear window. Descriptive statistics was used and the average of the 3 measurements of VA was considered. Wilcoxon Test was used to compare the average VA in each vehicle and position. Pvalue<0.05 was considered statistically significant.

Results: With regards to the front window, it is shown that in low contrast all the VLT tested were borderline for driving in categories C/D/E. In the lateral window, also in low contrast situation, all the VLT tested were above the limit for driving in categories C/D/E. In the rear window all measurements in high and low contrasts, with all VLT tested, were above the limit for C/D/E with the exception of the vehicle with VLT of 35%. Furthermore, most of them are borderline or above the limit for categories A/B. All vehicles showed significant reduction of BCVA compared to the default, except the group with VLT of 35%.

Conclusions: Visual acuity in high and low contrast is affected, especially in the rear window, by window films, not excluding the legally permitted ones. The increase of the rear window film VLT to 35% should bring safety to drivers especially in situations of decrease of contrast sensitivity.

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