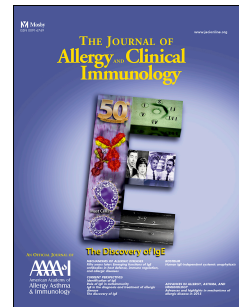


Accepted Manuscript

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PII: S0091-6749(17)30403-7

DOI: [10.1016/j.jaci.2017.01.037](https://doi.org/10.1016/j.jaci.2017.01.037)

Reference: YMAI 12683

To appear in: *Journal of Allergy and Clinical Immunology*

Received Date: 7 February 2016

Revised Date: 23 December 2016

Accepted Date: 16 January 2017

Please cite this article as: Demoly P, Maigret P, EliasBillon I, Allaert F-A, Allergic Rhinitis Increases the Risk of Driving Accidents, *Journal of Allergy and Clinical Immunology* (2017), doi: 10.1016/j.jaci.2017.01.037.

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Allergic rhinitis increases the risk of driving accidents

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Conflict of interest: The study managed by P. Demoly and F.A. Allaert was granted by Menarini, P. Maigret and I. Elias Billon are employees of Menarini.

Key words: allergic rhinitis, sleep disturbances, falling asleep, accidentology, car driving.

Capsule summary: Allergic rhinitis, especially those involving severe nasal, ocular, pharyngeal and respiratory symptoms, have a strong impact on the risk of driving accidents and should be managed specifically.

To the Editor

Allergic rhinitis (AR) disturbs patients' quality of life with consequences on their occupational and daily activities; it also reduces quality of sleep and induces daytime drowsiness (1), which can increase the risk of driving accidents. Connor et al. (2) showed that when people complained of feeling very drowsy while driving, the risk of having a traffic accident compared to a non-drowsy person was multiplied by 8.2. Some authors have hypothesised that drowsiness due to poor sleep may be a more common cause of accidents than alcohol and reported that studies are urgently needed (3). Therefore we conducted the "EVEIL" national survey. The main aim was to assess the consequences of AR on daytime awareness and driving and to identify through cluster analysis methodology the existence of a patient group at increased risk of car accidents based on the features of their AR.

We conducted a cross-sectional observational national survey in primary care allergy medicine and general practice on a randomised sample stratified geographically (quotas method). We involved 976 practitioners who were required to include the next four consecutive patients over 18 years old driving a vehicle and consulting for untreated AR or AR which was poorly controlled with a previous treatment.

The consequences of AR on daytime awareness were assessed by the EPWORTH drowsiness score (4) and awareness at the wheel by the KSS score (Karolinska Sleepiness Scale) (5). The EPWORTH scale is made up of 8 questions scored from 0 to 3, giving a sum of 0 to 24 which reflects the severity of daytime drowsiness. The KSS scale is made up of 9 awareness/asleep graduation scales varying from 1="extremely aware" to 9="very sleepy, considerable effort needed to remain awake and stop going to sleep". An ascending hierarchical cluster analysis (Ward method) (6) was used to identify the existence of groups at high risk of drowsiness and driving accidents incorporating the EPWORTH and KSS scores.

In our study, 3850 patients, average age 39 ± 14 years old, with a sex ratio close to 1, were included.

In 25.4% the AR was intermittent and mild, in 8.8% persistent and mild, in 17.9% intermittent and moderate to severe and in 48.0% persistent and moderate to severe. Half of the patients (53.3%) had a family history of allergy and 84.8% had a personal past history of AR but also of asthma (23.6%) and/or atopic dermatitis (18.2%). Allergy had been confirmed by tests in 46.9% of patients. The allergens, which were found in 61.0% of these patients, were predominantly pollens (79.3%), moulds and dust mites (44.1%) and animals (14.5%).

The EPWORTH score was 7.6 ± 5.4 (out of 24). Based on this score, 30.3% of patients had moderate (25.9%, $CI_{95\%}[24.5; 27.3]$) or severe (4.4% $CI_{95\%}[3.7; 5.0]$) drowsiness. The KSS score was 3.9 ± 1.8 which showed that not only were 39.4% ($CI_{95\%}[37.8; 40.9]$) of patients at risk of reduced awareness when driving, 24.4% were at high risk of having an accident: 18.8% had signs of sleepiness, 3.6% felt sleepy but remained awake without efforts and 2.0% felt sleepy and needed to make efforts to remain awake.

In addition, 63.8% of patients described on questioning that their AR had an effect on driving some of which had been dangerous including not having the right reflex in some situations (18.9%), having made

67 an unusual driving error (13.6%) or falling asleep for a fraction of a second (9.5%). Almost one fifth of
68 the patients (17.5%) also reported that they had needed to stop on the edge of the road or even that they
69 did not feel capable of driving (16.4%) and 0.7% reported they had a car accident.

70 The cluster analysis of the whole population using Ward's ascending hierarchy method identified two
71 almost equivalent sized patient groups: cluster 1 (n=1739; 47.7%) and cluster 2 (n=1910; 52.3%). This
72 methodology overcomes one of the limitations of the study of not having a control group. The
73 comparisons of their features show that cluster 1 contained patients experiencing drowsiness and lack of
74 awareness when driving which was far more severe than in cluster 2: EPWORTH 12.2 ± 3.4 vs 3.2 ± 2.6
75 ($p < 0.0001$) and KSS: 4.8 ± 1.6 vs 3.1 ± 1.5 ($p < 0.0001$). The effect of AR on driving statistically differs
76 between cluster 1 and 2. In particular, 85.2% vs. 45.3% of patients described that their AR had an effect
77 on driving, 26.2% vs. 12.4% they had not the right reflex in some situations, 18.6% vs. 9.7% they made
78 an unusual driving error, 15.2% vs. 4.3% they failed asleep for a fraction of a second, 23.7% vs 11.9%
79 they had needed to stop on the edge of the road, 23.5% vs 9.9% that they did not feel capable of driving
80 and 0.9% vs 0.6% reported they had a car accident.

81 Cluster 1 could also be distinguished on the ARIA classification by more persistent (60.9% vs 51.9%;
82 $p < 0.0001$) and moderate to severe AR (76.7% vs 54.8% $p < 0.0001$). The group at risk of drowsiness and
83 accident (cluster 1) had more severe nasal symptoms than the other patients but also they had eye,
84 pharyngeal and respiratory signs, fatigue and headaches which were 1.5 to 2 times as common. As a
85 consequence of their more severe nasal symptoms and more frequent ocular symptoms they were also
86 more often treated with oral and ocular H1 antihistamine. One limitation of the study is that the type of
87 antihistamines, and especially the proportion of first generation sedating antihistamines, was not reported.

88
89 These results show the impact of AR on the risk of sleeping while driving. Drowsiness is responsible for
90 one out of five cases of road accidents. It affects all drivers, although some conditions increase the risk.
91 The case of sleep apnoea syndrome is well known (7): when untreated, it triples the accident rate
92 compared to the general population. This risk is not known today for AR but the fact that almost fifty per
93 cent of patients with AR were at increased risk of a driving accident confers a level of seriousness which
94 is usually not acknowledged. A case control study should be conducted to evaluate the ratio of incidence
95 rate of motor vehicle crashes in AR patients by comparison to a non rhinitis population of drivers. This
96 study should also more precisely document the allergic origin of the rhinitis which is also one limitation
97 of our study. However the present results, describing an increase of the driving problems described by the
98 patients themselves, justifies active management and increased patient information about the risks they
99 run if they are not appropriately treated and adhere correctly to their treatment. They confirm the
100 experimental work of Vuurman EF (8) on a small amount of patients who concludes that untreated AR
101 can impair driving ability and put patients at risk and that drug therapy could reduce this impairment. In
102 particular, it is recommended (9) to adapt treatment according to the severity and level of management of
103 the AR and not using sedatives, particularly first generation H1 antihistamines, which affect driving.

Information strategies should also be developed for dispensing pharmacists who are increasingly being consulted directly by patients because of the apparently mild nature of the disorder.

Our study points out the extent of the consequences of AR on daytime drowsiness and awareness when driving and identifies the existence of a homogeneous group of patients at high risk of reduced awareness and driving accidents, characterised by a profile involving severe nasal, ocular, pharyngeal and respiratory symptoms. These patients should be informed of this risk and managed specifically.

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