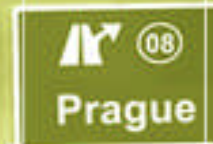


Fit to Drive

3rd International Traffic Expert Congress
Prague from June 19th - 20th 2008



Welcome



Diabetes Mellitus and Ability to Drive

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Study of **IMMORTAL** project

WORKPACKAGE

R1: AGEING, MENTAL ILLNESS AND MEDICAL DISEASE

R1.6: Effects of diabetes mellitus on driving performance and relation to fatigue and alcohol (BAC 0.5) effect

CDV (Transport Research Centre)

Co-operation: DA CR (Traffic Academy)

Purposes of the realised study

- To describe risky and sensitive areas, conditions and possibilities of attendance in the road traffic of diabetes drivers
- To discover other relevant circumstances including social context and education processes.
- To show the alcohol effect on driver capability and to compare it with effect of diabetes

Diabetes mellitus as a risky factor

- DM 1 is a chronic, lifelong disease requiring discipline, keeping of regime and enduring of permanent insulin application procedures
- Essential and most frequent complications connected with the illness in relation to assessment of the ability to drive:

Hyperglycaemia/Hypoglycaemia

Psychosocial problems as:

- Reaction to the diagnosis
- Adaptation process - stages of the initial shock, defensive psychological mechanism, refusing the reality, the anger and aggression
- Depressions
- Brittle diabetes
- Employment and partnership difficulties

Methods

- Laboratory psychological assessment of experimental group of diabetes drivers (D)
- Driver simulator test of three groups:
 - diabetes drivers (D)
 - drivers under alcohol effect (A) (BAC 0,05%)
 - control group of non impaired drivers (C)
- All of participants – anonymous voluntaries, DM I (insulin needed)

Psychological assessment

- **Test battery:**
 - focus to all of obligatory basic and relevant psychic functions (intellect, attention concentration, visual memory, orientation in space, reactions, structure of personality)
 - self-reported description of driver practice, diabetes parameters, professional and social circumstances of participants.
- **Comparison** of diabetic's with driver standards of individual tests
- Standard statistical evaluation procedures of **significant differences** between norms and individual results of diabetes group
- **Correlations** of obtained results with diabetes parameters – diabetes years, insulin doses and modus of insulin usage (pump)

Driver practice

- **Accident rate higher than normal population of drivers (compared with SARTRE data):**

Common driver population

Involved in a traffic accident in the last 3 years – with damage only **24%**
- with injury **9%**

Experimental sample of diabetics

Involved in a traffic accident in the last 3 years – with damage only **47.6%**
- with injury **4.8%**

- Main causes - driver's lack of attention
- Found no case of serious consequences, i.e., damage only
- Found no significant dependencies of the quality of driver's practice on diabetes parameters
- Found relation between insulin application by pump and bad driver practice (total accident rate)

Traffic offences

	Number of	%
Traffic offences in the last 2 years (no. of persons, men only)	14	21,9
Traffic offences in the last 2 years (total number)	26	100
thereof – speeding	15	57,7
- parking offence	9	34,7
- driving through red light	1	3,8
- driving without papers (licence)	1	3,8



Possibility of diabetes driver to modify risk of accident

- Possibility to detect the first symptoms of diabetes attack – regular self-monitoring, training of detection, responsibility, keeping of diet and life regime
- Possibility to react to the first symptoms is real, driver has time enough to break

Symptoms

- Feeling of fatigue, languidness
- Disorder of visual sensitivity
- Headache
- Feeling uncomfortable
- Spasm
- Lost certainty and security of driving

Impact to driver's behaviour

Reduced psychical performance (current or chronicle)

- Disorders of subtle moving coordination
- Disorders of attention
- Disorders of reactions (mistakes and longer reaction time)
- Disorders and changes of personality (current or chronicle), Disorders of self-sentiment (too low/high, Depressions and suicidal tendency)

Psychological assessment - basic psychical functions

- The common significant impairment was not identified
- Serious deterioration in particular cases
- The most sensitive psychical function - attention and cognitive functions, especially depended on visual perception
- No massive correlation or dependence of psychological characteristics on observed diabetes parameters
- Tendencies:
 - **Diabetes years** to lower verbal IQ, space orientation and imagination, and slower reactions.
 - **Insulin units/day** to lower quality of attention.
 - **Pump application** to better performance IQ, visual memory, space orientation, but high number of error reactions.

Psychological assessment – personality

- Alarming significant impairment of
 - emotional instability
 - emotional and internal modus of perception of life reality
 - tendency to fatalism and depression
 - lower self- control
- Correlations or tendencies:
- **Diabetes years** to rationality, extroversion and self-control.
- **Insul.units/day** to psychoticism, impulsiveness, lability, anxiety, fatality, paranoia.
- **Pump application** to lower responsibility

Categories followed during simulated test

- (1) **General level of driving skills**: assessment of basic driver tasks as preparation before starting drive, technique of drive, traffic signs observation, orientation in traffic situations
- (2) **Ability to avoid risk situations**: looking up them (numbers, relevance) and quality of prepared solutions
- (3) **Ability to act in standard risk and critical situations**: assessment of reaction to arisen risk traffic situation correctly and in time, ability to use the experience from this situation in repeating of the same situation
- (4) **The behaviour on the end of series of simulated attacks** by other drivers: measure of effort to manage this situation, manifestation of fatigue, vegetative manifestations

Experimental Group – Diabetes

- The participants in this group demonstrated:
- a nearly identical common driving ability as the control group - even better results in the category of critical situation avoidance
- ability to handle critical situations was considerably weaker (*as the probants in this test group demonstrated a definite tendency to aggressiveness, as observed*).
- The greatest deviation from the control group was observed towards the end of the cycle of simulated test tasks following a series of simulated attacks by other participants of traffic
- Towards the end of the test, the probants demonstrated decline of concentration and onset of fatigue. Tendency to pseudokinetosis was higher.

Conclusions from this Study

- No possibility to classify DM patients across-the-board as unable to drive a motor vehicle
- But critical results were obtained individually
- Limitations of this study:
 - The relative fitness and compensated DM 1, absence of health complications was selection criterion of DM participants - we are not able to describe difficulties of drivers impaired by de-compensated DM 1 or by later complications

Recommendations

- Individual and continuous approach of medicine/psychological assessment of diabetes applicants of driver licence and periodical assessment of diabetes drivers.
- Obligatory psychological assessment (as the first assessment of diabetic applicants and periodic one of diabetic drivers)
- Checking of stabilized diabetes and kept proper regime must be required obligatory
- Special educative programs for diabetes drivers
- Patients with DM 2 are more risky due to frequency of hypoglycemia, applying similar measures to DM 2 patients is recommended by doctor.



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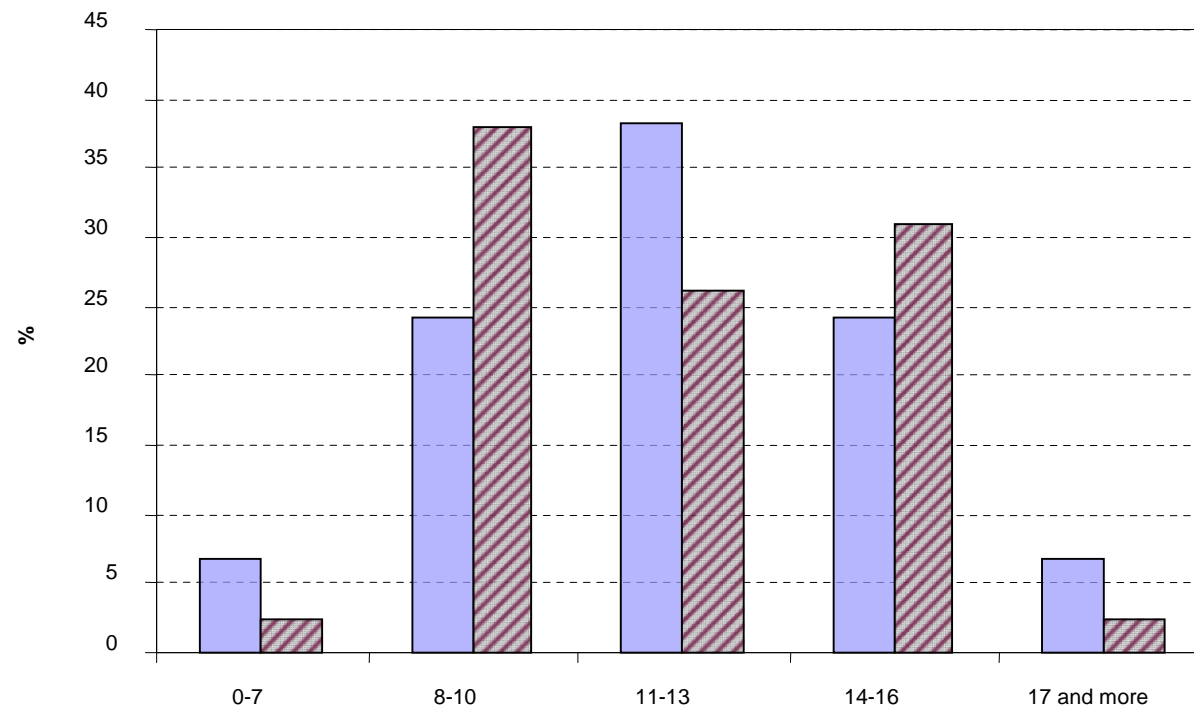
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Visual Memory

Column ■ = Norm percentages of values

Column ▨ = Experimental percentages of values





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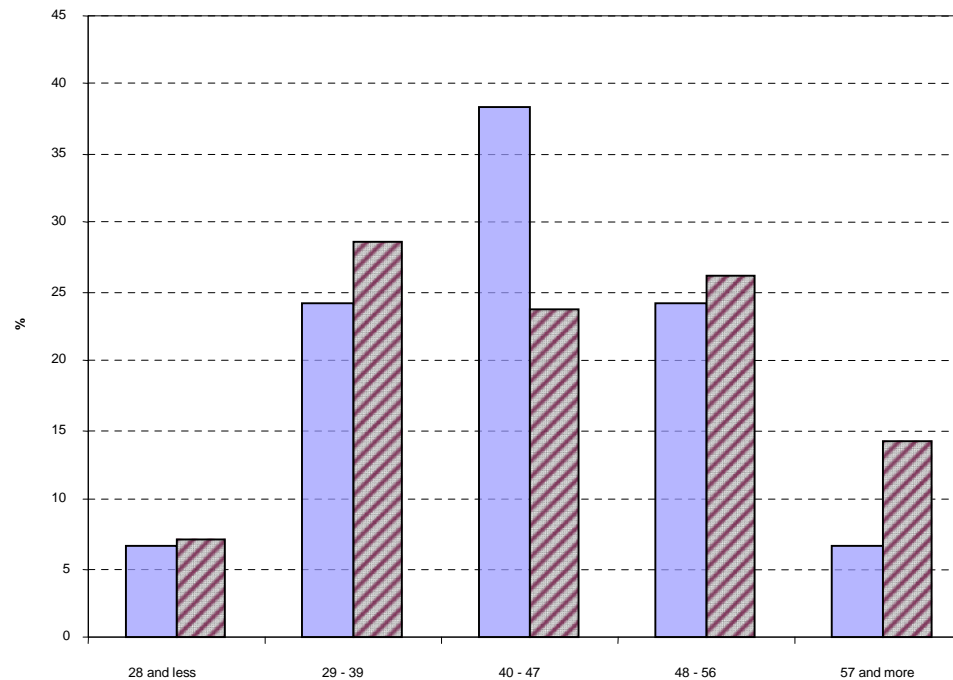
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Quick Space Orientation

Column ■ = Norm percentages of values

Column ▨ = Experimental percentages of values





Attention Concentration Test - % of Errors

Column ■ = Norm percentages of values

Column ▨ = Experimental percentages of values

