

Evaluation of a screening test for alcohol-related problems (CAGE) among employees of the Campus of the University of São Paulo

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Abstract

Alcohol intake may play a significant role in absenteeism, delays and accidents at the workplace. However, its detection is limited by difficulties of both patients and physicians regarding the subject. The CAGE questionnaire may be an easy, fast and non intimidating alternative to detect alcohol-related problems (ARP).

Objectives: To evaluate the validity coefficients of the CAGE (sensitivity, Sen; specificity, Spec; positive predictive value, PPV, and the area under the ROC curve - AUC) among employees of the Campus of the University of São Paulo using the Structured Clinical Interview for DSM-IV, SCID 2.0.

Methods: A random 203-worker sample was selected to be surveyed with a socio-demographic questionnaire followed by the CAGE questions and the SCID 2.0. CAGE validity coefficients were analyzed according to the SCID 2.0 results for alcohol abuse and dependence, while sociodemographic data were analyzed by the chi-square test.

Results: Among 192 interviewed workers, the prevalence of the CAGE-positive was 19.8%. Validity coefficients results were for ARP: Sen=84.4%, Spec=93.1%, PPV=71.1% and AUC=0.88 ($p<0,01$); and for alcohol dependence: Sen=91.3%, Spec=89.9%, PPV=55.3% and AUC=0.90 ($p<0,01$). There were significant associations between CAGE-positive and the following characteristics: 1) age (61 years or more, $p=0,04$), 2) male gender ($p=0,01$) and 3) blue color occupations ($p=0,02$).

Conclusions: The PPV of the CAGE suggested its better performance in screening ARP (abuse and dependence) than only alcohol dependence. The association with age and sex could be related to limitations of the questionnaire. Blue color occupations could indicate a risk factor for ARP. The CAGE was considered valid for the screening of ARP at the workplace.

Keywords: Alcohol-related disorders; Scales; Alcoholism; Working environment

Introduction

According to data from the World Health Organization,¹ problems related to alcohol use are responsible for 54% of work accidents with absence and for 40% of accidents followed by death. The International Labor Organization² adds that workers with alcohol-

related problems use to be absent at the job 5- to 7-fold (26 days per year in average) than workers without these problems. In Brazil,¹ alcoholism is the third cause of absenteeism and the eighth for receiving the sickness absence in the welfare system; patients with alcohol-related problems use three-fold health services and

are subject to delays 13- to 14-fold at work. Harwood³ has estimated in US\$ 185 billion the costs related to alcohol abuse in the US in 1998, and more than 70% of these costs were attributed to a decrease in the productivity. Morawski et al⁴ and Blum et al⁵ observed that moderate alcohol use has a higher impact than heavy use in labor-related problems, such as absences and delays. Ames et al⁶ have studied the repercussion on the work not only of heavy drinking, but also of the consequences after the consumption, demonstrating that workers who came to work and reported having a 'hang-over', complained significantly more about criticism of supervisors, personal clashes with colleagues, about somnolence and feeling ill than workers who had not reported a 'hang-over'.

The diagnosis of alcohol-related problems is hampered by several aspects: the defensive attitude of patients, denying the problem, and that of physicians who do not provide credibility to the possibility of treatment, using pre-conceived moral concepts, which frustrate the possibility of transforming the clinical interview in a process of sensitization and motivation.⁷ The scarce available time of health professionals and the lack of training and specialized personnel in this kind of approach has been the target of studies and has inspired trainings.⁸⁻⁹

The diagnosis of Alcohol Dependence Syndrome (ADS) through a fast and easily-applied method, with proven sensitivity and specificity, may be performed using the CAGE questionnaire, as proposed by Ewing & Rouse.¹⁰ Translated and validated into Portuguese by Masur & Monteiro,¹¹ with 88% of sensitivity (percentage of alcoholists correctly identified) and 83% of specificity (percentage of non-alcoholics correctly identified), the CAGE was successfully applied as a detecting instrument for alcoholism in hospitals,¹² in the general population¹³⁻¹⁵ and in different working environments.¹⁶⁻¹⁸

Some studies performed in the last two decades^{13,19-20} have called the researchers' attention for the sensitivity of the CAGE regarding the detection of alcohol-related problems and not only for ADS, even when considering the traditional questionnaire's cut-off punctuation (two positive answers).

This study is justified for its being the first to use the diagnostic criteria of the DSM-IV, according to the Structured Clinical Interview for the DSM-IV (SCID-2.0),²¹ to assess the results of the CAGE regarding alcohol abuse and dependence, called in this study alcohol-related problems (ARP).

Objectives

The objective of this study is to assess the CAGE questionnaire regarding its sensitivity, specificity, positive predictive value and area under the ROC (Receiver Operating Characteristics) curve for ARP among civil servants of the Prefecture of the Campus of the University City (PCO) using the SCID-2.0.

Material and methods

The PCO is responsible for the administration and maintenance of the campus of the University City of the University of São Paulo (USP) and has 515 employees in the administrative and operational sectors. From 1995 onwards, the Program for the Prevention and Treatment of Drug Use at USP (PRODUSP) of the Interdisciplinary Study Group on Alcohol and Drugs (GREA) of the Department and Institute of Psychiatry of the Clinical Hospital of the Medical School

of the University of São Paulo has started several preventive activities at USP, sponsored by the Rectorate and the University Hospital. This study is included among the activities being developed at PCO.

Considering a study with a sectional design over a population of 515 employees at PCO, the sample should have 109 employees, according to the software Epi Info Version 6.04b, taking into account the expected 10% frequency of alcohol dependence and accepting an alpha error of 5%, with a 10% confidence interval. However, the small number of possible employees identified using this sample could compromise the statistical analysis of the socio-demographic data. Therefore, considering this limitation and that this study aims to assess conditions of abuse and dependence, we have chosen a sample with approximately half of the studied population. In order to obtain a random sample, inclusion criteria were: pertaining to the personnel of the PCO in the period of the interviews and having an even job employee id number (n=243). Thirty-four employees who were transferred to other units were excluded from the sample, as well as 11 who were licensed from work at the moment of the interviews, 3 who had recently died and 3 who refused to participate after the reading of the informed consent. Refusal cases occurred at the reading of the informed consent, as employees were in doubt about the use of the information. In these cases, license and death, the occupational records were consulted for possible ARP. Therefore, the sample initially composed by 243 employees was reduced to 192 employees of the PCO. Chi-square analysis has not revealed significant differences between the total population of employees and the sample regarding the main socio-demographic data (age, marital status, gender and function).

Selected employees received and signed the informed consent in order to participate, beginning then to answer the sociodemographic questionnaire, followed by the CAGE, which was created by Ewing & Rouse¹⁰ as a detecting instrument for alcoholism, being composed by four questions with yes-or-no answers:

C – Have you, sometime, feel that you should reduce the amount of drinking or stop it?

A – Do people upset you because they criticize your way of drinking?

G – Do you feel guilty for the way you use to drink?

E – Do you use to drink in the morning in order to reduce nervousness or hang-over?

According to their authors, a positive answer would justify a more detailed further assessment. Since the creation of the CAGE, some studies^{11,22-23} have analyzed the different figures of positive answers (from one to four) to the questionnaire and have defined its cut-off point, according to sensitivity and specificity criteria, at two positive answers. Steinweg and Worth²⁴ have suggested that the CAGE be preceded by an open question ('Let's talk about your drinking habit?'), what would make the questionnaire less intimidative, and would increase its sensitivity. In the current study we have chosen to apply the CAGE to detect ARP (abuse and/or dependence) according to the cut-off point of two or more positive answers and with the open question as an introduction to the questions. When the interviewee reported having stopped drinking, the questions were referred to one year before that.

After applying the socio-demographic questionnaire and the CAGE, the employees were interviewed according to the Structured Clinical Interview for the DSM-IV (SCID-2.0) which starts with a ge-

neral screening, as a script for a non-structured clinical interview, and, afterwards, is divided into modules which correspond to the major diagnostic categories. In the interviews criteria for Alcohol Abuse and Dependence of the SCID-2.0 were used to assess the CAGE results for the different ARP. When the employee had positively punctuated for alcohol abuse and dependence according to the SCID-2.0, only the second criterion was considered. A psychiatrist at a PCO consultation office has conducted the interviews for a two-month period.

The statistical analysis was initially based on the CAGE assessment as a detecting test for ARP, calculating its sensitivity ($S = \text{Number of true positive} / \text{total of cases}$, multiplied by 100), specificity ($E = \text{Number of true negatives} / \text{total of healthy subjects}$, multiplied by 100), positive predictive value ($PPV = \text{Number of true positives} / \text{total of positives in the test}$, multiplied by 100) and area under the ROC curve (AUC), which is the measure of the instrument's capability to estimate the diagnosis, according to the results for alcohol abuse and dependence defined by the SCID-2.0. AUC was deemed valid for values higher than 0.5 and significant for p values equal to or lower than 0.5.

Next, socio-demographic data of PCO employees were analyzed according to their statistical association regarding ARP, alcohol abuse and dependence and the CAGE results using the chi-square test and Fisher exact test when the expected frequency was lower than 0.06, considering p values equal to or lower than 0.05 as statistically significant.

It was necessary to redivide some categorical variables due to the insufficient data for the statistical analysis in some of them.

Therefore, marital status (single, married/living together, separated and widower) was recategorized as married/living together and without partner); the wage ranges 1 minimum wage (MW), 2 to 5 MW, 6 to 9 MW, 10 to 15 MW, 16 to 19 MW, 20 to 30 MW and more than 31 MW became 3 (1 to 5 MW, 6 to 9 MW and 10 MW or more); the time at work, initially divided in 1 to 5 years, 6 to 11, 12 to 17, 18 to 23 and more than 24 years, was modified into the following ranges: from 1 to 11 years, from 12 to 17 years and 18 years or more. Satisfaction at work (yes, no, more or less) was transformed into yes and some dissatisfaction.

The questionnaires were always applied sequentially, preventing thus sample losses.

Results

One hundred and ninety-two PCO employees were interviewed and answered the socio-demographic questionnaire and to questions of the CAGE and SCID-2.0. Eleven employees have not come to the interview and eight of them were not included in the study for being in sick leave, due to orthopedic (n=5), cardio-circulatory (n=2) and surgical (n=1) problems. Among the three employees who refused to participate after the reading of the informed consent, only one had previous history of ARP in his/her medical record. Among recent death cases, there were no references to ARP.

As shown in Table 1, the prevalence of ARP, according to the SCID 2.0, at the PCO in the year was 16.7%, that of abuse was 4.7% and of dependence, 12%. CAGE positive prevalence was 19.8%.

Table 1 shows the frequency of ARP, abuse, alcohol dependence and positive CAGE according to some sociodemographic variables.

Table 1 – Number and percentage of subjects with alcohol-related problems (ARP), abuse, dependence and CAGE-positive according to the variables age, gender, marital status, schooling and function at the PCO, in 2001

Characteristics	Total number of the sample	With ARP		Abusers		Dependent		CAGE-positive	
	n (%)	n (%)	p	n (%)	p	n (%)	p	n (%)	p
Age			.65		.02		.20		.04
20-30	7 (3.6)	2 (28.6)		2 (28.6)		0 (.0)		1 (14.3)	
31-40	65 (33.8)	8 (12.3)		4 (6.1)		4 (5.6)		7 (10.8)	
41-50	71 (37.0)	14 (19.7)		2 (2.8)		12 (16.9)		18 (25.4)	
51-60	35 (18.2)	5 (14.3)		1 (2.8)		4 (11.4)		6 (17.1)	
61 or more	14 (7.3)	3 (21.4)		0 (.0)		3 (21.4)		6 (42.9)	
Gender			.02		.60*		.13*		.01*
Males	172 (89.6)	32 (18.6)		9 (5.2)		23 (13.4)		38 (22.1)	
Females	20 (10.4)	0 (.0)		0 (.0)		0 (.0)		0 (.0)	
Marital status			1.00*		1.00*		1.00*		1.00*
Married/living with spouse	149 (77.6)	25 (16.8)		7 (4.7)		18 (12.1)		30 (20.1)	
Without spouse	43 (22.4)	7 (16.3)		2 (4.7)		5 (11.6)		8 (18.6)	
Type of work			.20		1.00*		.17*		.02
Operational	152 (79.2)	28 (18.4)		7 (4.6)		21 (13.8)		37 (24.3)	
Administrative	40 (20.8)	4 (10.0)		2 (5.0)		2 (5.0)		1 (2.5)	
TOTAL	192 (100.0)	32 (16.7)		9 (4.7)		23 (12.0)		38 (19.8)	

* Level of statistical significance according to Fisher exact test

Table 2 – Number and percentage of subjects with alcohol-related problems (ARP), abuse, dependence and positive CAGE according to the variables minimum wages (MW), time at work and satisfaction at the PCO, in 2001

Characteristics	Total number of the sample	With ARP		Abusers		Dependent		CAGE-positive		
		n (%)	n (%)	p	n (%)	p	n (%)	p	n (%)	p
Wage (in MW)				.29		.63		.33		.14
1 to 5	97 (50.5)	18 (18.6)			4 (4.1)		14 (14.4)		23 (23.7)	
6 to 9	84 (43.8)	14 (16.7)			5 (6.0)		9 (10.7)		15 (17.9)	
10 or above	11 (5.7)	0 (.0)			0 (.0)		0 (.0)		0 (.0)	
Time at work				.82		.49		.51		.14
1 to 11 years	22 (11.5)	3 (13.6)			2 (9.1)		1 (4.5)		1 (4.5)	
12 to 17 years	129 (67.2)	23 (17.8)			6 (4.7)		17 (13.2)		29 (22.5)	
18 years or above	41 (21.4)	6 (14.6)			1 (2.4)		5 (12.2)		8 (19.5)	
Satisfaction				.45		1.00*		.57*		.81*
Yes	156 (81.3)	28 (17.9)			8 (5.1)		20 (12.8)		32 (20.5)	
Some dissatisfaction	36 (18.8)	4 (11.1)			1 (2.8)		3 (8.3)		6 (16.7)	
TOTAL	192 (100.0)	32 (16.7)			9 (4.7)		23 (12.0)		38 (19.8)	

* Level of statistical significance according to Fisher test

Considering the age range, it was observed a higher frequency of ARP among employees aged 20 to 30 years, although there were high frequencies among age ranges from 41 to 50 years and from 61 years or more. Alcohol abuse was significantly associated with the youngest age range, decreasing relatively and absolutely with the increase in the age range, reaching 0 in the last age range. Among alcohol-dependent subjects, the highest concentrations were those of age ranges from 41 to 50 years and 61 years or more. No employee aged 20 to 30 years was identified as dependent. Positive CAGE was significantly associated with the age range of 61 years or more, representing almost half of the employees in this age range.

Considering gender, there was an association between males and ARP, what did not occur for the categories of alcohol abuse and dependence. Neither the CAGE nor the clinical interview identified any female employee. Positive results for the CAGE were also significantly associated with males.

The analysis of the marital status showed similar frequencies of ARP among married/living together subjects and those without partners; the same occurred regarding results for abuse and dependence, as well as for the CAGE.

Regarding the variable type of work there was higher concentration of employees with ARP in the operational sector. The abuse condition was similar between the different types of work, whereas, regarding dependence, there was a three-fold number of alcohol-dependent subjects, although this difference was not significant. When the CAGE results were analyzed, it was observed that almost all positives were from the operational sector, showing a statistically significant association between this function and positive CAGE.

According to the results shown in Table 2, the differences between wage ranges were not statistically significant. The lowest

wage range had the highest frequency of ARP, dependence and CAGE-positive, although the intermediate wage range (6 to 9 MW) had results slightly lower. For the abuse condition, however, in absolute and relative figures, there was discrete predominance of the wage range between 6 and 9 MW. Neither the SCID 2.0 nor the CAGE identified any employee in the highest wage range.

Regarding time at work, differences were not significant, although alcohol dependence and CAGE-positive were nearly three times more frequent from 12 years at work onwards than in the range between 1 and 11 years of work at the PCO. Regarding alcohol abuse, among the range with the fewest working time, there was almost 2-fold frequency of positive results than among ranges with higher working time.

Considering satisfaction at work, there was no significant difference between groups who showed satisfaction and some dissatisfaction, with higher frequencies among all studied conditions among the former.

CAGE validity indicators are displayed in Table 3.

Thirty-eight employees (19.8%) answered positively to two or more questions of the CAGE. Considering the results of the SCID-2.0 for alcohol abuse and dependence as a whole (ARP), of each 10 identified subjects, more than 8 had positive results for the CAGE. Having a higher sensitivity for isolated dependence, the CAGE has identified more than 90% of the dependent subjects identified by the SCID 2.0. The results for CAGE specificity were higher for ARP (alcohol abuse and dependence) than for dependence alone.

Of each 10 subjects identified by the CAGE, 7 had probability of having any ARP and 5 may have alcohol dependence, what may be seen by the PPV results. Despite this difference, both results, alcohol abuse and dependence as a whole, (Figure 1) and alcohol dependence alone (Figure 2), when compared to the CAGE results according to the ROC curve, show areas significantly higher than 0.5.

Table 3 – Comparison of the validity indicators of the CAGE according to the SCID 2.0 criteria for alcohol abuse/dependence and alcohol dependence

	Abuse/Dependence	Dependence
	Observed % (CI 95%)	Observed% (CI 95%)
Sensitivity	84.4% (66.5-94.1)	91.3% (70.5-98.5)
Specificity	93.1% (87.7-96.3)	89.9% (84.1-93.9)
Positive predictive value	71.1% (53.9-84.0)	55.3% (38.5-71.0)
Negative predictive value	96.8%(92.2-98.8)	98.7% (94.9-99.8)
AUC área	.88	.90
P	<.01	<.01
Prevalence	16.7%	12.0%

The first CAGE question was positively and isolatedly answered by 60 employees. Of these, 5 were considered as false negatives according to the SCID-2.0 results (3 cases of abuse and 2 of dependence) and 21 received the diagnosis of alcohol abuse (n=4) or dependence (n=17) in lifetime. It is noteworthy that, of these 21 mentioned employees, 10 claimed having been abstinent for 10 years or more and 11, for more than 2 years. These employees were included as CAGE-negative in the study.

Discussion

The CAGE showed to be a hardly intimidating, easily- and quickly-applicable instrument (nearly 1 minute to be applied). Its validity indicators for ARP and alcohol dependence were similar, except for PPV, which was higher in the first case. The interpretation of a CAGE-positive as suggestive of any ARP would be the most indicated and could result in a less intimidating approach to the patient as the diagnostic of alcohol dependence is many times received as a recrimination. The diagnosis of alcohol abuse should not be interpreted as an indication of a future condition of dependence, and cannot be ruled out, as it is in itself a cause for health, social, family and occupational problems. Patients who were assessed regarding ARP and were oriented about the associated risks were receptive to the clinical orientations.¹⁹⁻²⁰ It should be emphasized that the questionnaire does not replace a detailed clinical interview.

The results for sensitivity and specificity found by Masur & Monteiro¹¹ are similar to those found in this study considering the criterion of alcohol dependence of the SCID-2.0. According to this interpretation, cases identified as false positives would be 17, although in 6 of them (15.7% of CAGE-positive ones) the SCID-2.0 has identified alcohol abuse patterns. Considering the CAGE only as a screening instrument for alcohol dependence, these 6 cases would be considered as negative ones although having risk patterns for alcohol consumption.

Utilizing the CAGE, Lima et al¹⁶ found 8.8% prevalence of 'problematic drinkers' among the workers of an oil refinery. Andrade et al¹⁷ also using the CAGE, found 8.51% of 'alcoholics' (the authors' expression) in a weaving industry. Furuno,¹⁸ studying workers from a car reseller with the CAGE, found 16.8% prevalence of possible cases of alcoholism, a result which is very close to that found

among PCO employees for alcohol dependence (16.7%). Hemansson et al,²⁵ using the Alcohol Use Disorders Identification Test (AUDIT) and the dose of carbohydrate-deficient transferrine (CDT), found a 19.5% prevalence for alcohol-related problems among different working places. According to Webb et al,²⁶ using the Mortimer-Filkins test, there was a 5.7% prevalence of alcohol-related problems among blue-collar workers, whereas in other 15.2% of workers the results indicated the possibility of risk consumption patterns. The results reflect specific characteristics of the different work places studied and of the different types of occupations.

Prevalence rate of ARP and alcohol dependence at the PCO are related to the male gender. This is important when comparing these results with those of Carlini et al,²⁷ which found 11.2% prevalence of alcohol dependence (17.1% on males and 5.7% on females) among the interviewed.

The results for the variable age range (Table 1) show that 42.9% of employees aged above 61 years or more punctuated positively according to the CAGE, but, of them, only 3 had positive results for the SCID-2.0, that is, 3 identified cases would be false positives. In two of these cases, there was a positive response to questions one (decreasing or stopping) and two (being criticized) of the CAGE and, in the other case, positive answers in the first and third ones (feeling guilty). These responses, considering the negative results for abuse and/or dependence according to the SCID-2.0, may suggest a criticism to the consumption patterns, both by the subject and by others, due to the age and possibly chronic health problems. It would not be expected to find a statistically significant difference for this age range considering that, within the current population patterns, the increase in the ratio of people aged above 60 years in the general population would have led to a decrease in the average per capita of alcohol consumption.²⁸

Considering the variable gender (Table 1), we observed that no female employee had positive results in both questionnaires. Previous studies, using the CAGE in different population groups, showed a remarkable prevalence of alcohol-related problems among males. On the other hand, Monteiro et al,¹⁴ reapplying a methodology similar that of Capriglione et al,¹⁵ found a decrease from 3.6:1 in the first study to 2.1:1 in the second one in the

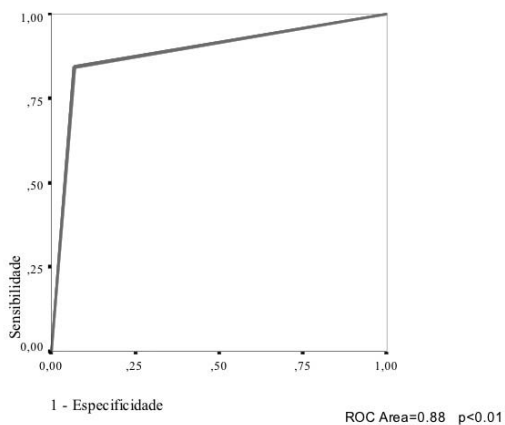


Figure 1 - ROC Area of the CAGE for alcohol abuse/dependence

male/female ratio for CAGE-positive cases, what may suggest a convergence of male-female behavior patterns regarding alcohol abuse. Moreover, according to the same study, the sensitivity of the CAGE in the detection of alcohol-related problems among females is lower than among males (46% and 75%, respectively). Female behavior of drinking less and having lower probability of drinking excessively as compared to males is a well-known behavior, even though the data should be described regarding the variable type of work to interpret adequately the result found. The PCO has 41 female employees, 24 of them in white-collar functions. Of the 20 female employees interviewed, 13 pertain to the administrative and 7 to the operational sector. The PCO is a predominantly male working environment, with men assigned to workshops or to external maintenance services. Among interviewed women, except for those working in the security sector (4 employees) all worked daily in the administrative sector, in administrative or maintenance functions (3 as general helpers) therefore in an environment which scarcely tolerates or hardly stimulates the consumption habits.

Data related to marital status at the PCO showed that the groups with or without partners had similar results for alcohol-related problems. Rego et al¹⁵ have also not observed significant differences between marital status and positive results in the CAGE. Other factors, besides marital status, such as relationship with children, spouse and with other relatives should be considered concerning the relation of the subject with alcohol.²⁹

Mandell et al,³⁰ analyzing alcoholism among occupations, have observed a higher risk among workers of the civil work, industrial transportation, and maintenance sectors, as well as carpenters, gardeners, rural workers, cleaning personnel, and mechanics. Rodríguez-Martos et al,³¹ have also found abusive drinkers in risk sectors such as civil work, transportation and mass media industries. Vasse et al³² identified a higher alcohol consumption mean among operational workers than among operational workers and that 12.5% of the studied sample drank excessively.

The results found in this study show a significant relation between CAGE-positive and the operational occupation (Table 1), what may represent a risk for work and reflect the pressure of colleagues and problems in the selection of personnel on the alcohol consumption habits among workers.³⁰ However, this association

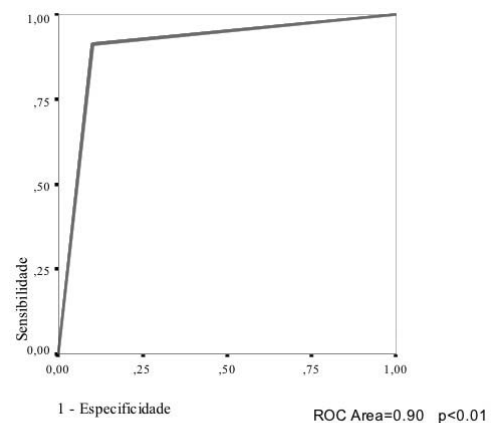


Figure 2 - ROC Area of the CAGE for alcohol dependence

was not observed in the results of the SCID 2.0, what may suggest subclinical conditions or else a risk perception related to alcohol consumption among these employees.

The progressive clinical evolution of the ADS is manifested when we consider the age ranges with the highest prevalence (Table 1). The presence of alcohol abuse prevailed significantly among the youngest age ranges and the diagnosis of alcohol dependence was more frequent from 41 years of age onwards. It would be expected a decrease in the prevalence of ARP among the highest age ranges as a result of the reduction in the consumption or the abstinence of alcohol-dependent subjects, besides a possible selection bias, as the clinical repercussions become more important with the evolution of these problems,^{29,33} hampering workers with chronic health problems to remain active.

As mentioned above, the PCO is mainly composed by operational workers, males, working predominantly in jobs with low complexity and directly exposed to weather conditions, factors which directly influence the consumption of alcohol. When considering the marital status and wage ranges (Table 2), we observe the existence of a standardization of the socioeconomic profile of employees, what can be reflected in the formation of both professional and personal informal links between the workers.

The high level of satisfaction at work among the employees (Table 2) allows interpretations such as real satisfaction or else as a certain intimidation to criticize their working conditions. The current unemployment level may have somehow influenced the data interpretation, what would justify the idea that, despite their unsatisfactory working conditions, the fact of being employed would be the most relevant factor.

As we have seen, the application of the CAGE in recruiting or periodical exams or in those for special activities (drivers, machine operators, etc.) should have to consider the existence of false positives, as well as the presence of subclinical conditions, and, else, of alcohol abuse conditions. Other important aspect is the fact that there are no studies related to the test-retest validity of the questionnaire, as its systematic application among subjects of a same population could lead to its recognition, leading to a lower reliability of the instrument.

One limitation regarding the methodology applied in this study is

due to the application of the CAGE and the SCID 2.0 by the same interviewer, as a positive result in the questionnaire could lead the interviewer to seek traces confirming this result. This kind of bias can be reduced by means of structured clinical interviews, like the one used in this study. According to the questionnaire's authors, the application of the CAGE should not be conclusive, determining that a more detailed examination of the positive cases be performed for the diagnosis. Therefore, interviewers, be they clinicians or labor physicians, should reassess as suspicious the previously detected cases.

Conclusions

The CAGE has proven a scarcely intimidating, economical, quickly and easily applied instrument. The interviewed had no difficulty to understand the questions and its application has not required technical explanations, what may allow its inclusion among self-reported questionnaires or among those filled in by trained personnel but not necessarily of the medical area.

Its utilization to detect alcohol-related problems resulted in indicators of sensitivity and specificity within the literature patterns and in an increase in its positive predictive value, enabling the detection of alcohol abuse conditions among employees at the PCO.

Besides the abuse condition, the application of the CAGE at the workplace should consider the presence of other alcohol consumption conditions, deemed subclinical in this study.

The inclusion of the CAGE in the routine of occupational exams may be useful, considering its limitations as a screening instrument.

The results show, furthermore, that the studied workplace shows a prevalence of alcohol-related problems which deserve attention, but that are within the patterns of other services. This information is relevant for the self-esteem at the institution's workplace in order to develop a preventive work.

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