

ARTICLE

VALIDATION OF A SMELL KIT (KITAN D) BASED ON ODORS KNOWN IN IBERO AMERICA

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SUMMARY

Kitan D is an olfactory evaluation kit developed in Argentina according to the smells that are familiar to the Ibero-American culture to detect alterations in smell. In 2023, a validation of the discriminant capacity of the kit was carried out to distinguish between people who had alterations in their sense of smell and people with a healthy sense of smell. The results show that the identification of 14 odors is capable of making this distinction particularly in people between 18 and 64 years old, smokers and non-smokers. In the case of people over 64, smell discrimination is more difficult due to the gradual loss of smell due to aging or “presbyosmia” that produces a natural dispersion of identification scores reported in the literature, which is why this kit includes a wide variety of aromas that allow improving the sensitivity of the test. The correlation of odor detection and identification scores of patients with smell disorders obtained with this kit and with the validated BAST-24 kit was also verified. Like the BAST-24 kit, this kit allows us to distinguish between damage to the trigeminal nerve and the olfactory nerve in both age groups. and is suitable for monitoring the improvement or deterioration of a patient’s sense of smell throughout a treatment. Kitan D, unlike the BAST-24 kit, allows you to detect phantosmia very easily, as it includes an odorless bottle that is used during the test.

KEYWORDS: Kitan D. Presbyosmia. Smell Test.

INTRODUCTION

Smell is integrated into the limbic system, functional MRI reveals; This area of the brain is made up of: the amygdala, the hippocampus and the hypothalamus. The brain’s amygdala sends information related to the fear and anxiety that certain odors can provoke. Memory lies in the hippocampus. And in the hypothalamus the emotions, and the instincts. That is why a smell can awaken memories and also emotions.

The evaluation of olfactory function plays an important role in rhinology; especially in the preoperative evaluation and documentation of endonasal surgery or for diagnosis and rehabilitation of olfactory disorders. Clinically,

screening tests are used as a first step in evaluating the sense of smell (Delank , 1998). A screening test should recognize patients with normal olfactory function and distinguish them from patients with hyposmia or anosmia. A widely used method to detect the sense of smell is to present odorants in small bottles and ask the patient to identify the odor by giving them a choice between a few options. This procedure is called “forced selection.”

The proliferation of easy-to-use tests to measure olfactory function has increased our understanding of the sense of smell in humans, including functionally influencing factors such as age, sex, exposure to toxic agents, and various rhinological factors and diseases. neurodege-

nerative diseases, including Alzheimer's and Parkinson's disease.

The nature of odor identification is closely related to familiar aromatic elements, generally limiting the use of olfactory tests to the country or region where they have been developed and validated.

For this reason, there are already several tests olfactometrics marketed in the US and Europe. As examples we can cite in Switzerland the test called Smell Diskettes Olfaction Test (SDOT) (Briner , 1999) which is a kit based on 8 fragrances: coffee, vanilla, smoke, peach, pineapple, rose, coconut and vinegar. Also the rapid screening test proposed by Hummel in Germany (Hummel et al., 2010) based on only 3 odors: clove, rose and coffee. Finally, we cite the example of the Barcelona Smell Test (BAST-24), which is an olfactory test whose reproducibility and validation has been studied in a healthy Spanish population. The objectives of the study using the BAST-24 were:

1. evaluate olfactory results in a Spanish population differentiated by age groups, sex and smoking habit
2. determine the difference between the characteristics of smell when the test is performed in both nostrils separately or simultaneously; and
3. validate the kit.

In principle, it is recommended to always include in these olfactometric kits :

- Odors that mainly stimulate the olfactory nerve (cranial nerve I), others that stimulate the trigeminal nerve (cranial nerve V) - e.g. vinegar - and others that stimulate both in a similar way (e.g. eucalyptus, smoke, onion, cloves). That is why these three types of odors are included in our monitoring kit, as in BAST 24 or in the examples of the Swiss kit (Briner 1999) and the one proposed by Hummel (Hummel et al., 2009).

- Smells that are known to people in general and that is why it is convenient to have a kit appropriate to the local culture. We have tried to respect this criterion and have used odors that are well known to our general population.

- Smells whose perception is as similar as possible even at advanced ages. For this reason, odors already tested in BAST 24 have been selected, which showed little dependence of the results on age. However, people over the age of 65 begin to have less of a sense of smell and this must be taken into account by the professional who performs the test (Cardesin et al., 2006).

The loss of the sense of smell is called anosmia. The decreased ability to smell is called hyposmia. Until very recently these alterations had no solution, but now, a new therapy allows those who are deprived of smell to

recover that capacity.

For more than a decade, there has been clear evidence that olfactory training with odorants can restore smell. In 2009, a group of German researchers led by specialist Thomas Hummel described this wonderful possibility of retraining the sense of smell thanks to brain plasticity.

The training is individualized and consists, depending on each case, of repeated exposure to different odors of the patient's choice for as long as necessary, one at a time. The basis of the training is that the patient associates the smell with his memory (evoking memories with that substance). The exercise should be performed for 5 seconds to 5-10 minutes, three or four times a day. Olfactory training based on repeated stimulation is an experience that improves olfactory skills. It is a beneficial therapy for patients with post-viral , post-infectious , loss of smell due to chronic rhinosinusitis and also in losses due to craniocerebral trauma or idiopathic (those whose causes are unknown).

Importantly, 80% of the taste sensation comes from the sense of smell and the remaining fraction from the sense of taste. For this reason, the partial or total loss of the sense of smell contributes to a decrease in the taste and enjoyment of food as well as other activities, and its recovery restores not only the ability to smell, but also to taste food.

MATERIALS AND METHODS

Kitan D - Description

Kitan D has been designed to allow the professional to investigate the state of smell of a patient who reports having lost it or notice it altered through exposure to 14 different intense aromas through olfactory strips embedded in them and asking if they perceive smell and then asking you to identify it among 4 possible options. This kit consists of a set of 15 bottles containing different aromas that serve to monitor the state of the sense of smell: 13 aromas that stimulate the olfactory nerve (cranial nerve I), 1 aroma (vinegar) that stimulates the trigeminal nerve (cranial nerve V) and 1 odorless bottle (to detect phantosmia , which is an alteration in which odors that are not real are perceived). The odors included in the kit are listed in table 1.

Smell
Eucalyptus
Lemon
Smoke
Pink
Nail
Coconut
Onion
Neutral (odorless)
Vinegar
Banana
Coffee
Tangerine
pineapple
Cheese
Vanilla

Table 1. Numbered bottles included within Kitan D and their contents

Additionally, the kit provides the professional with a questionnaire that must be used during the patient interview and an Excel spreadsheet to summarize results about each patient’s sense of smell. During the kit and validation the smell is not revealed to the participant and is not written on each bottle, which has a number. The contained odor is only available to the professional.

KITAN D - FUNDAMENTALS OF HOW IT WORKS

Kitan D’ s design is based on previous research such as:
 - Hummel ‘s works in Germany (Hummel et al., 2009, Hummel et al., 2010). In his 2009 work he teaches that the four primary smells described by Dr. Henning are those that correspond to the four fragrances: floral (in German blumig), fruity (in German “ fruchtig ”), resinous (in

German “ harzig ”) and spicy or aromatic (in German “ würzig ”) and are useful for people to recover their sense of smell and taste. Dr. Hummel used the fragrances of rose, lemon, eucalyptus and clove. In his 2010 work he describes a quick test to monitor smell based on smells of rose, cloves and coffee.

- The work of Cardesin and colleagues (Cardesin et al., 2006) that we attach, which also describes the importance of including vinegar fragrance to stimulate the trigeminal, since trigeminal damage that cannot be retrained has sometimes been detected. with the other fragrances. This article describes the validation of the BAST 24 kit marketed in Spain.

- The work of Briner (Brinner 1999) that describes a test for monitoring smell with 8 fragrances (coffee, vanilla, smoke, peach, pineapple, rose, coconut and vinegar).

There are several factors that can alter the sense of smell and that the doctor must take into account when performing this test (Doty et al., 1984, Doty et al., 1996):

- Smoking: Non-smokers tend to smell better than smokers.
- Sex: female people tend to smell better than male people.
- Age > 65 years: it smells better at a younger age (Doty et al., 1984). In the work published by Doty et al (1996), the deterioration is detected as early as 55 when the sample size of the study increases. The deterioration produces a greater dispersion of the “normal smell” score range in this age group and can overlap people with some minor alteration with others with normal smell for their age.

Age	This is a very important fact because especially after the age of 65, so-called <u>presbyosmia occurs</u> , which is a gradual, non-pathological loss of smell as a result of aging.
Do you smoke?	Smoking can negatively affect the sense of smell and it is advisable to take this habit into account when evaluating the subject under study.
Occupation	Certain occupations can negatively affect the sense of smell, for example a person working in a paint or paint factory where volatile organic substances are used in high concentrations in the air.
Have you noticed any alteration in the smell or taste of food or drink?	It is important to know if the person has noticed a decrease or alteration in their perception of odors, although there may be cases where there is no self-perception of the decrease in smell because it can be gradual.
Interventions on the nose or nearby areas?	Certain surgeries can alter your sense of smell.
Head trauma with or without loss of consciousness?	Some head injuries can affect your sense of smell.
Another illness that you remember?	Some diseases can affect the sense of smell, such as respiratory diseases of viral origin, chronic rhinosinusitis, and nasal polyps.
Respiratory infections of viral origin?	Respiratory diseases of viral origin (flu, COVID-19) can affect the sense of smell.

Table 2. Initial questions included in the Kitan D form and their justification

Given the presbyosmia that manifests itself from 60 - 65 years of age, odors already tested in BAST 24 have been selected, which presented little dependence of the results on age (Cardesin et al., 2006).

Furthermore, by virtue of medical experience regarding factors that can affect smell, at the beginning of the interview for the olfactometric test with Kitan D, the questions detailed in Table 2 with their corresponding justification are asked:

These initial questions help the professional understand the factors that can affect the state of smell.

KITAN D VALIDATION PROTOCOL DESIGN

Kitan D validation study design is based on validation studies reported in the literature. Three important references can be cited:

kit	Country of origin	Validation report
UPSIT ¹	USA	1“Gold standard”, (Doty et al. 1984, Doty et al., 1989)
BAST 24	Xavier Valero Pharmacy, Barcelona, Spain https://www.olfabast.com/	Validated only with 120 healthy people. (Cardesin et al., 2006)
Smell Diskettes Olfaction Test (SDOT)	Novimed, Switzerland http://www.smelldiskettes.com/index.php	Validation with 102 healthy and 22 hyposmic / anosmic people (Briner , 1999)

Table 3. Validation studies of olfactometric kits

All of these kits present an instance of “forced selection” of aromas, that is, the test subject is given the choice between 3 (SDOT) or 4 (BAST 24 and UPSIT) options about which odor they are perceiving. so that you can choose which one you think is correct and then your number of correct answers is recorded, based on which it is determined if your sense of smell is healthy or if you have hyposmia or anosmia. In the case of UPSIT and SDOT, only this olfactometric exploration mode is used , while in the case of BAST 24 the subject is also asked if they detect the odor and identify it. In Kitan D, for the detection of alterations in the olfactory nerve, there are 13 odors with 4 options for each one. The probability that a person who does not smell anything (anosmic) can be correct by choosing at random can be estimated mathematically with a binomial distribution, as explained by Briner (1999). For the case of Kitan D we obtain

the following distribution curves of results

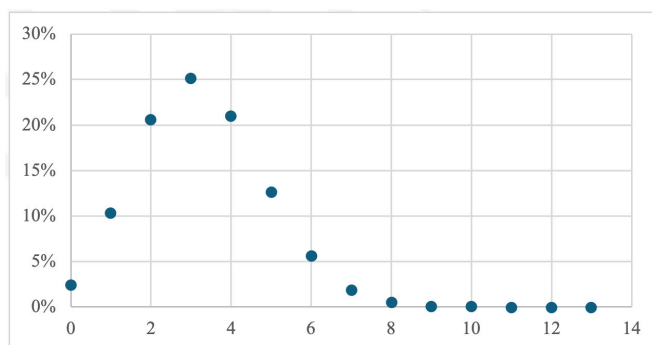


Figure 2. Binomial probability distribution of the number of correct answers for an anosmic person (without smell) with 13 aromas and 4 options per aroma (25% probability of getting each one correct)

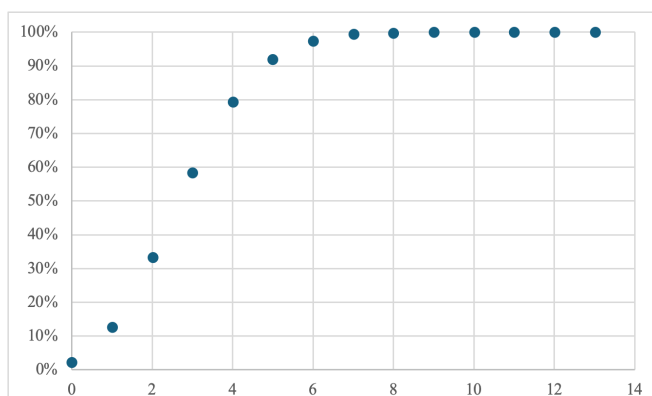


Figure 3. Cumulative probability of number of correct answers for an anosmic person (without smell) with 13 aromas and 4 options per aroma (25% probability of getting each one correct)

As you can see, it is easy to see that an anosmic would have a score similar to 3 and could have a certain probability of having scores between 1 and 6 with this kit. Therefore, as done by Briner (1999) and Cardesin and collaborators (2006), the study focused on the healthy population to see that it could be clearly distinguished from the population with alterations in the performance of the olfactory nerve.

hyposmia and a complete anosmic was included to verify if it could be verified that their score was clearly lower than that of the healthy population. Given that it is clear that the anosmic cannot reach a score higher than 6, there will be a population of severe or moderate hyposmics who are also expected to be in a similar situation, although somewhat more favorable than the anosmics . Part of this population was evaluated simultaneously using the valid Spanish BAST-24 kit used in other international studies to see the agreement between both results.

KIT VALIDATION PROTOCOL

To evaluate the kit and its questionnaire, a study was carried out on a population of 54 adults of both sexes, of different ages with and without previously diagnosed smell disorders.

For this purpose, the participants were summoned and a diagnostic interview was conducted; they were made to sign an informed consent to authorize the use of the data collected, indicating that it would be used in a study of a kit to detect alterations in smell.

Before the participant attended the testing appointment, they were instructed not to use perfumes on their body or clothing because these odors can alter the test results. We proceeded as follows:

1. At least 30 minutes before testing, the kit box was opened in a well-ventilated place, away from heat sources and direct sunlight so that there were no residual odors to confuse the participant during the test.

2. The participant sat comfortably in front of the professional and the professional asked and recorded his age, smoking or non-smoking status (it was explained to him that this was done to better evaluate the state of the sense of smell because smoking in itself alters this sense).) and if you had recently suffered from a viral infection in the respiratory system (COVID-19, cold, flu, etc.). Then it was explained that they were given to smell strips with liquids with different smells or no smell to answer two questions:

a. Do you smell any smell? Possible answers: "Yes" or "No".

b. What is the smell? In this case, the professional gave him a choice between some possible odors and the patient had to say which of them was the one he perceived.

3. The operation that the professional performed with each bottle is described here:

- He opened the bottle, dipped the tip of an olfactory strip into the liquid, and held the soaked portion toward the participant.

- The participant sniffed the part of the strip soaked in the liquid by gently sniffing, placing it 1 – 2 cm from their nostrils.

- After about 5 seconds, the professional asked the two questions and wrote down the results in an Excel spreadsheet.

- The form was filled out as follows:

a. In the column "Do you smell any odor?" A 1 is placed if the patient says yes and is left empty if the patient says no.

b. In the column "What is the smell?" A "1" is placed if

the patient guesses the correct smell among the smells that the professional offers as an alternative (Note: although the bottle label only has a number without describing the smell, the professional knows what the correct answer is by a table that he can access.

- Finally, when the smell of the bottle has been evaluated, the professional closes the bottle and discards the strip in a closed container or in a waste container with a lid so that the smell does not disturb the smell of the following aroma.

The jars were opened in the numerical order contained on their label for all participants. In Annex 1 of this validation report you can see the informed consent form and the Excel spreadsheet for Kitan D.

At the end of the test, the correct answers were added in the column of Do you smell any smell? and what is the smell? for odors perceived by cranial nerve 1 (all except those in jars 8 and 9) and it was also considered whether the participant perceived an odor and what type in the neutral jar (jar No. 8) and if he detected and identified the odor. vinegar smell (perceived through cranial nerve V or trigeminal nerve). These results were then evaluated by anonymizing the data.

RESULTS

POPULATION SAMPLE

52 adults over 18 years of age were evaluated, of which 6 were smokers. Among the people who participated, 56% were female and 44% were male.

Regarding ages, 7 of them were over 65 years old and 46 were between 18 and 64 years old.

The previous diagnosis and self-perception of the state of smell is described in Table 3:

Age	Smoking	No alteration	mild hyposmia	Moderate to severe hyposmia	Anosmia
18-64	No	28	2	7	1
	Yeah	4	—	3	—
65 and older	No	—	—	—	—
	Yeah	6	—	1	—

Table 4. Smell status of participants in the Kitan D validation study.

Regarding the previous diagnosis, the criteria were the following:

- Moderate to severe hyposmia and anosmia: previously diagnosed by Dr. Cuevas or when there is self-perception of loss of smell linked to chronic rhinosinusitis, severe asthma, dysosmia or phantosmia diagnosed prior to performing the smell test with Kitan D.
- Mild hyposmia: people who self-perceived a certain loss

of smell without showing any of the health conditions listed above. The rest of the people were considered to have no alterations due to a pathological condition.

In addition, 10 participants with a diagnosis of moderate to severe hyposmia were evaluated simultaneously using BAST-24 and Kitan D to study if there is a correlation in the results of the kits. It was chosen to carry out this comparison with people with smell disorders to have a greater dispersion of results that would allow the correlation between both kits to be investigated. As these kits have different numbers of fragrances that stimulate the olfactory nerve, the scores obtained were transformed into percentages of correct answers.

This sample had the following composition:

Sex	Age (years)	Smoker
Male	32	No
Female	48	No
Male	18	No
Female	Four. Five	Yeah
Female	Four. Five	Yeah
Female	88	No
Female	30	Yeah
Female	74	No
Female	47	No
Female	61	No

Table 5. Smell status of participants in the Kitan D validation study.

The validation tests were carried out between February 9 and March 20, 2023.

ODOR DETECTION AND IDENTIFICATION

We divided the results into odor detection for the answer to the question “Do you smell any odor?” and in the identification of odors based on the answer to the question “What is the smell?”

ODOR DETECTION

In the comparison with the BAST-24 kit, the results were obtained regarding the detection of odors that stimulate the olfactory nerve (olfactory nerve) summarized in table 6.

Sex	Age (years)	Smoker	% detection	
			BAST-24	Kitan D
Male	32	No	85	77
Female	48	No	85	77
Male	18	No	0	0
Female	Four. Five	Yeah	75	69
Female	Four. Five	Yeah	35	23
Female	88	No	70	62
Female	30	Yeah	95	100
Female	74	No	80	38
Female	47	No	80	92
Female	61	No	85	77

Table 6. Percentage of odor detection using BAST-24 and Kitan D in the same participants.

The results of table 6 are graphed in figure 4.

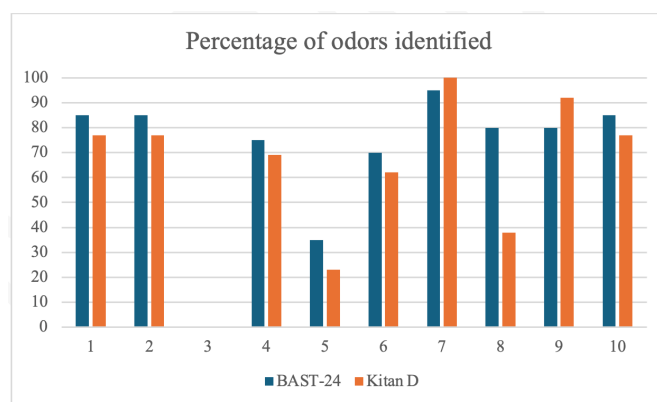


Figure 4. Percentage of aroma detection with BAST 24 and Kitan D in the same patient sample. (Note: the number of the horizontal axis follows the order of table 7)

The correlation coefficient between both results was calculated using Excel and was very high ($r = 0.894$). In addition, the percentages of detection of odors found with Kitan D versus those obtained with BAST-24 were graphed (figure 4). This high degree of correlation is visualized in the graph.

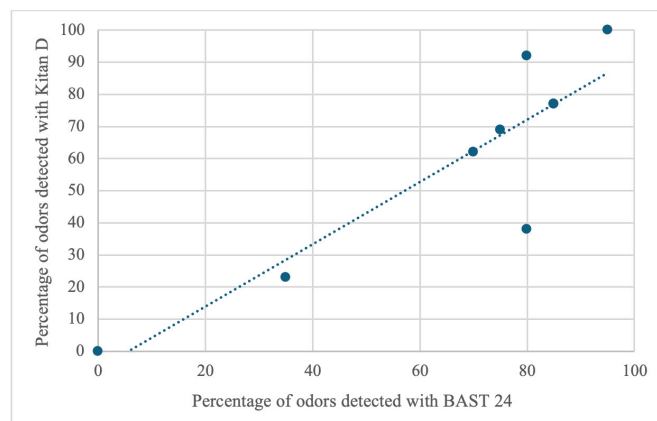


Figure 5. Correlation between the percentage of odor detection using Kitan D and BAST-24 in people diagnosed with moderate to severe hyposmia

As BAST 24 and Kitan D contain different odors in terms of number and type, it is important to compare the results for each odor for those odors that are common to both kits. This comparison can be seen in figure 6.

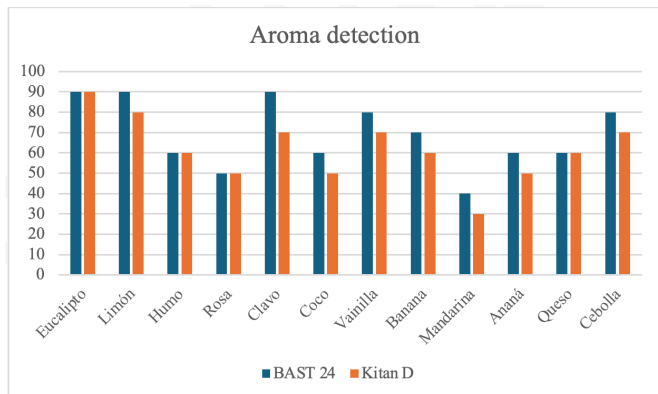


Figure 6. Comparison between BAST-24 and Kitan D of the percentage of detection by type of odor.

In Figure 6 it can be seen that both kits behave very similarly in terms of identifying the same type of odor by the same sample of patients.

Furthermore, based on the response of all participants to the question “Do you smell any smell?” of Kitan D for odors that stimulate the olfactory nerve (cranial nerve I), the odor detection results were obtained that can be seen in figures 5.a, 5.b and 5.c:

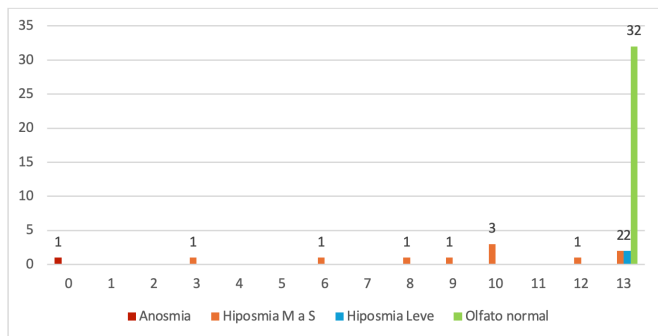


Figure 7.a Detection score obtained with Kitan D by people aged 18 to 64 with different previous diagnoses

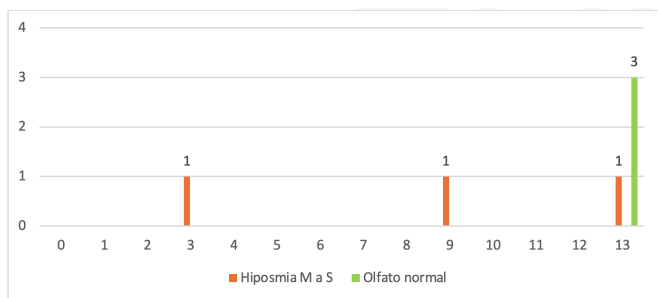


Figure 7.b Detection score obtained with Kitan D by smokers aged 18 to 64 with different previous diagnoses

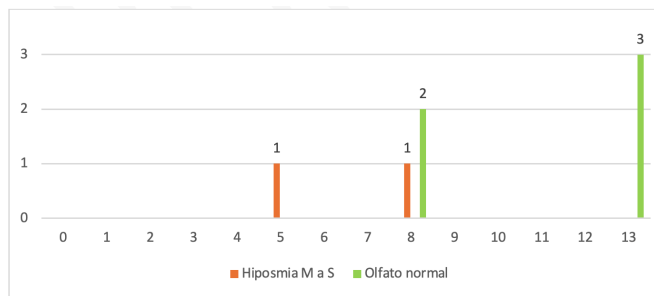


Figure 7.c Detection score obtained with Kitan D by people aged 65 years and older with different previous diagnoses

Additionally, two non-smoking people, aged 18 to 64 years with moderate to severe hyposmia, presented phantosmia that was detected because they perceived an odor in the unscented bottle (No. 8).

Regarding the detection of odor in the bottle with the smell of vinegar that stimulates the trigeminal nerve (cranial nerve V), only three participants have not detected this odor and all have a diagnosis of moderate to severe hyposmia.

SMELL IDENTIFICATION

Regarding the identification of odors in the group of 10 participants with moderate to severe hyposmia who were evaluated with BAST-24 and Kitan D, the results are summarized in Table 7.

Sex	Age (years)	Smoker	% of correct answers	
			BAST-24	Kitan D
Male	32	No	40	46
Female	48	No	55	38
Male	18	No	0	0
Female	Four. Five	Yeah	30	31
Female	Four. Five	Yeah	twenty	8
Female	88	No	25	31
Female	30	Yeah	40	54
Female	74	No	35	31
Female	47	No	35	38
Female	61	No	40	54

Table 7. Percentage of correctness in odor identification using BAST-24 and Kitan D in the same participants with moderate to severe hyposmia.

These results are graphed in figure 8.

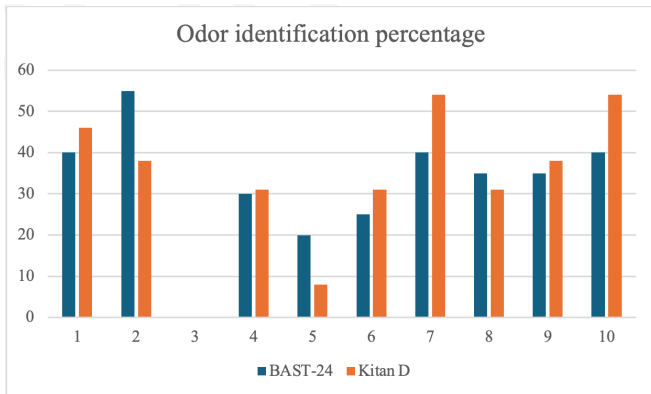


Figure 8. Comparison between BAST-24 and Kitan D of the percentage of identified odors (Note: the number on the horizontal axis follows the order of table 7)

The correlation coefficient between both results was calculated using Excel and was very high ($r = 0.823$). In addition, the percentages of detection of odors found with Kitan D versus those obtained with BAST-24 were graphed (figure 6). This correlation is visualized in the graph.

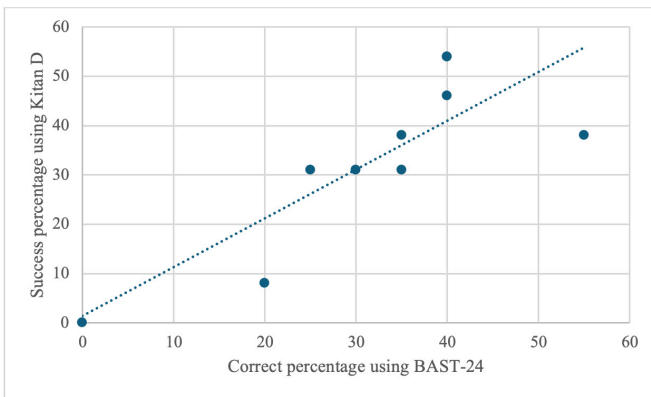


Figure 9. Percentage of correctness in odor identification using Kitan D vs. those obtained using BAST-24 in the same participants with moderate to severe hyposmia

As BAST 24 and Kitan D contain different odors in terms of number and type, it is important to compare the identification results of each odor in those odors that are common to both kits. This comparison can be seen in figure 10.

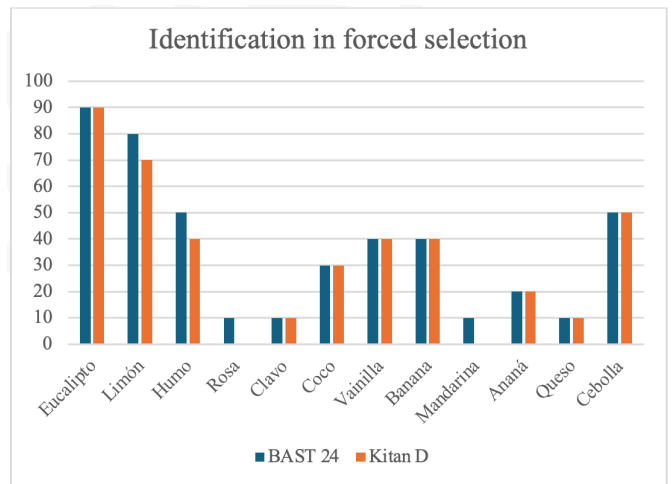


Figure 10. Comparison between BAST-24 and Kitan D of the identification percentage of each odor

Based on the answer “What is the smell?” Using Kitan D only, the odor identification results were obtained that can be seen in figures 5.a, 5.b and 5.c:

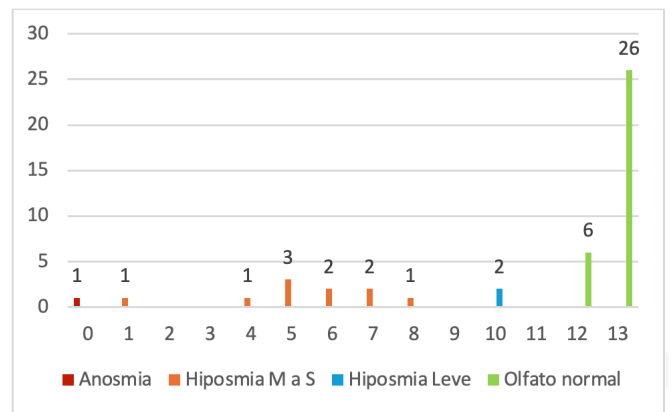


Figure 11.a Identification score obtained with Kitan D by people aged 18 to 64 with different previous diagnoses

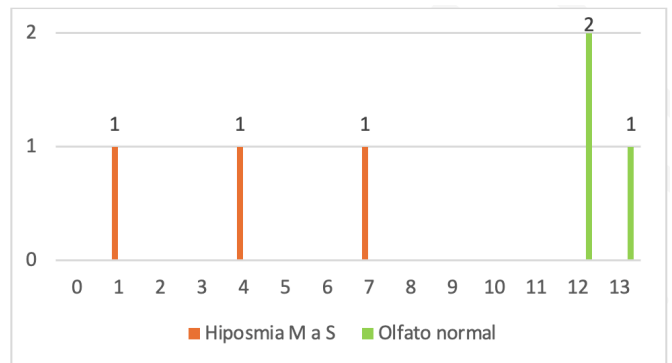


Figure 11.b Identification score obtained with Kitan D by smokers aged 18 to 64 with different previous diagnoses

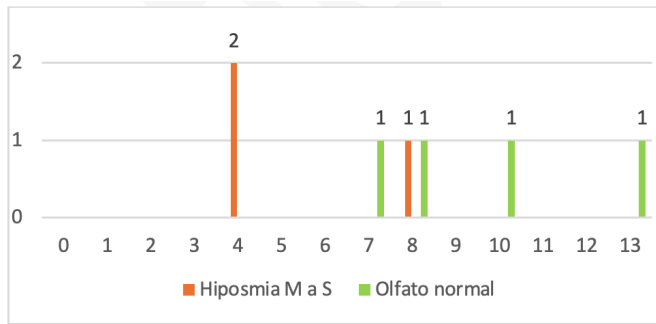


Figure 11.c Identification score obtained with Kitan D by people aged 65 years and older with different previous diagnoses

In addition to the results presented in figures 11.a, 11.b and 11.c., 2 people with moderate to severe anosmia were detected who did not smell vinegar, indicating damage to the trigeminal nerve in addition to that of the olfactory nerve.

DISCUSSION

The design of Kitan D with olfactory strips allows its use by professionals with healthy people and people with disorders without hygienic risks or the spread of diseases. The high identification percentages achieved in people without self-perception of anosmia in the age range 18 to 64 years show that the concentration of odorants is adequate for the detection and identification of odors. The results of percentage of detection and correctness of odor identification using Kitan D in people with anosmia or hyposmia are correlatable with those obtained with the validated BAST-24 kit, which is a validated olfactometric kit marketed in Spain.

The results of detecting odors that stimulate the olfactory nerve show that there is a certain correlation between the previously diagnosed state of smell and the Kitan D score, but a person with moderate to severe hyposmia in the 18 to 64-year-old group was able to detect odor in all the jars. Thus, the percentage of odor detection has limited diagnostic value because the score is not as sensitive to variation in olfactory status, although it may provide an indication, particularly in severe hyposmia or anosmia. The odor identification results show that Kitan D, by the method called “forced selection” - the person who performs the test identifies the perceived odor based on a group of different alternatives - is able to discern the state of smell in people of 18 to 64 years based on the score obtained in a much more precise way than in the case of detection. Within this age group, 3 healthy smokers and 3 smokers with moderate to severe hyposmia were evaluated, who presented scores similar to those of non-smokers with a similar state of smell. This is the most

widely used method in the world for this type of olfactometric testing and our validation data confirms its usefulness.

To characterize the response to people over 65 years of age, a larger sample of this age group would be required. In this study, a more dispersed behavior can be seen than the age group of 18 to 64 years, as expected from the literature (Doty et al., 1984). This is seen in both detection and identification. In both cases there is some overlap between people without prior perception and with prior perception of loss of smell, surely due to presbyosmia, which is the gradual loss of smell due to aging that is usually noticeable after approximately 65 years of age, as observed in the excellent work of Doty and collaborators with a large number of people who performed the test (Doty et al., 1984). In conclusion: this age group presents a certain correlation in detection and identification between the score and the state of smell, but there is greater confusion of results due to presbyosmia.

These data are similar to those obtained by Briner and Simmen (1999) with a kit called Smell diskettes that contains 8 odors.

Although the question: Do you smell any smell? It does not have as much diagnostic value for hyposmia alterations, it is considered appropriate to retain it to detect phantosmia from bottle No. 8 and because it also offers better support for the result of the evaluation.

Based on the results obtained, we can say that based on the scores obtained in odor identification with Kitan D, it can be said that people between 18 and 64 years old obtain:

Odor identification score with Kitan D	Result
12-13	Smell without alterations
8 - 11	mild hyposmia
≤ 7	Moderate or severe hyposmia
0	Anosmia

In people aged 65 years and older, this score may be affected by the loss of smell due to aging and this may make it difficult to diagnose another additional cause as occurs with other olfactometric kits (Doty et al., 1984, Cardesin et al., 2006).

On the other hand, the perception of odor in the neutral bottle (No. 8) indicates phantosmia.

The lack of perception of the smell of vinegar indicates alteration in the performance of the trigeminal nerve that does not occur in all people with moderate to severe hyposmia.

CONCLUSION

Kitan D is considered a validated diagnostic kit for performance problems of the olfactory nerve (hyposmia , anosmia, phantosmia) in people between 18 and 64 years old based on the score they obtain by smelling the contents of its 15 bottles and identifying the odor of each one answering the question What is the smell? based on 4 possible predefined options in the form of this kit (see form and options in the annex of this report).

As for people who have alterations in the performance of the trigeminal nerve, the smell of vinegar allows this problem to be detected. This smell is also used in other commercial kits in Europe (e.g. Smell diskettes, see Briner , 1999).

The odorless bottle that is associated with the same questions as the others allows the detection of phantosmia , which is an advantage over other kits such as BAST-24.

In people aged 65 years and older, the criteria of people aged 18 to 64 can be taken, but there may be people who, due to presbyosmia, have alterations that they do not self-perceive and that are due to gradual deterioration due to aging without additional causes. This dispersion is typical of age and is reported in the literature (Doty et al., 1984, Cardesin et al., 2006). The score in these people must be accompanied by other evidence such as factors that may have caused deterioration of smell that can be detected with Kitan D' s introductory questionnaire.

CONFLICTS OF INTEREST :

None

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