Self-Medication Among Military Fighter Aircrews

Mathilde du Baret de Limé; Jonathan Monin; Julie Leschiera; Jonathan Duquet; Olivier Manen; Thomas Chiniard

BACKGROUND: The practice of self-medication among military fighter aircrew could compromise flight safety because of the adverse effects that can occur in flight. However, data on this subject is scarce. The aim of this study was to identify the determinants of the practice in this population.

METHODS: A cross-sectional study was carried out among the French Air Force fighter aircrew based on an anonymous questionnaire distributed electronically. The questions included personal characteristics, opinions, and relations with the healthcare domain as well as the use of self-medication in general and before a flight.

RESULTS: Between March and November 2020, 170 questionnaires were reviewed for an overall return rate of approximately 34%. Our data showed an absolute self-medication rate of 97.6%, but the frequency of its use was rare or nonexistent in 53.5% of cases. Factors associated with a more frequent use of self-medication were the function of pilot, age under 35, having a regular prescription, lacking intentionality toward getting enough sleep, having confidence in the medical profession, and some specific clinical situations. The consumption of 97 medications was recorded and 49 before a flight.

DISCUSSION: Despite the limitations due to the design of this survey, results suggest that the use of self-medication in fighter aircrews is a reality, but that the frequency of its use is less common. This practice is probably the result of a complex interaction between many personal factors. However, its impact on flight safety remains uncertain.

KEYWORDS: self-medication, nonprescription drugs, aviation medicine, pilots, military personnel.

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The definition of self-medication is not unanimous throughout current literature, but some common principles stand out. It refers to the use of a drug on one's own initiative for the purpose of care, without a medical prescription for the current event, and with possible help from others (healthcare professionals or family and friends). In France, self-medication might concern 53.5–84.1% of the general population.[1,16] However, the unregulated use of medication raises concerns during some occupational activities, such as piloting aircraft, because of the adverse drug reactions (ADR) that may occur in flight. Additionally, fighter pilots are a model of their kind, subject to extreme aeronautical constraints. Any slight metabolic modification (pharmacological or not) might therefore interfere with their adaptive balance, and compromise flight safety. French fighter aircrews are no exception to these specificities. However, the availability of many over-the-counter drugs may vary from one country to another, including those considered to be unsafe for flight, such as codeine.[4] Interpretation of data on self-medication in these populations should primarily take into account the country where the study was conducted.

Yet, the literature on self-medication among fighter aircrews is poor. Self-medication rates in these populations ranged from 33 to 71% in former small cohorts of French fighter pilots.[10,13,14] The largest cross-sectional survey conducted in 2009 in three French aeromedical centers reported a self-medication rate of 56.3% in 1316 civilian and military pilots of all specialties, including 12.5% of fighter aircrews.[6] However, the aircrew populations included in this study were very different in terms of their aeronautical constraints or the medical requirements for flying, making it

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difficult to interpret its results. Consulting a physician for a common health problem is a practice that concerns less than one aircrew out of two. The three main reasons mentioned were that the pathology was perceived as insignificant, that it was a waste of time, and that they feared unfitness to fly.[6] In the French armed forces, flight surgeons are military general practitioners with a triple role: to provide primary care for flying and nonflying military personnel, to decide on flight fitness restrictions for aircrews if necessary, and to advise aircrews and Command.[9] The question of the quality of the relationship between the aircrews and the flight surgeon might therefore arise.

The main objective of this article is to identify the factors that explain the practice of self-medication in the population of the French Air Force fighter aircrews. The secondary objectives are to quantify the practice and the frequency of self-medication in the population of fighter aircrews, to establish the list of drugs consumed in the framework of self-medication by these fighter aircrews, to evaluate their attitudes regarding a current health problem, to evaluate the quality of the relationship between the fighter aircrews and the flight surgeon and to evaluate the risk of the practice of self-medication for the flight safety.

METHODS

Subjects

This multicenter, observational, cross-sectional study was conducted among fighter aircrews belonging to the French Air Force (FAF). The inclusion criteria were: to be an active member of the FAF, with a function such as "Fighter Pilot" or "Combat Systems Officer"; to have completed their initial training; to be assigned to an FAF unit located in metropolitan France belonging to one of the three command chains including a fighter aviation component (Strategic Air Forces Command, Fighter Aviation Air Brigade or Military Air Expertise Center), and to be a volunteer for participation in the study. The exclusion criteria of this study were to have an aeronautical activity classified as "subscription" (FAF aircrew not belonging to a flying unit, but having a limited volume of aeronautical activity in order to maintain technical skills or operational qualifications); to belong to an FAF Presentation Team, an FAF Reserve Section, or a drone squadron; or to be a member of a foreign army.

The study was promoted and funded by the French Military Health Service and received the agreement of the FAF Major General. According to the French regulations for research involving humans, an approval of an ethics committee was mandatory. Thus, the Committee for the Protection of People "Sud-Ouest et Outre-Mer II" issued a letter of acceptance dated January 27, 2020, under the number ID-RCB: 2019-A02311-56.

Material

An anonymous electronic self-questionnaire was created specifically for this study, including some parts of questionnaires from previous studies dealing with self-medication among French aircrews,[6,10] and the Patient-Doctor Relationship Questionnaire (PDRQ-9).[15] It included 150 questions divided into 5 sections: the first dealt with the subject's general information, aeronautical experience, and medical data; the second with their perception of their health; the third with their attitudes and practices when facing a common health problem; the fourth with their consumption of medication; and the fifth with their confidence in the medical community, including the flight surgeon. There were 13 clinical situations considered to be representative of a common health problem which were presented to the subject. They were asked to rate the frequency with which they self-medicated in each of these situations using a 5-point Likert scale ranging from "Never" to "Always". By assigning values to the Likert scales (from 0 for "Never" to 4 for "Always") and averaging the values for these responses, a mean score for self-medication was obtained, with possible values ranging from 0 to 4. The frequency of self-medication was a dichotomous variable with two possible values, with "rare or absent" self-medication (if the mean score for self-medication ranged from 0/4 to 1/4 included) or "more frequent" self-medication (if the mean score for self-medication ranged from 1/4 excluded to 4/4).

The primary endpoint included answers to a set of questions on seven explanatory hypotheses: 1) socio-demographic characteristics of the subjects (age, gender, mode of recruitment, aircraft flown, function on board); 2) medical data (regular treatment, having a treating physician); 3) aeronautical experience (total flight hours, seniority in the FAF, qualifications); 4) health perception (opinions on specific suggestions); 5) attitudes and practices regarding a common health problem; 6) trust in health professionals; and 7) quality of the relationship with the flight surgeon. A statistical association was sought between these factors and the frequency of self-medication.

Regarding the secondary endpoints, the frequency of self-medication included responses to questions assessing how often subjects self-medicated in the 13 clinical situations. This criterion was fulfilled if at least 1 of the 13 responses was other than "never". If one of the situations was selected, a list of conditionally displayed medications was offered, and a free-form field could also be filled in. The list of the medications was based on these answers. The attitudes toward a common health problem were based on responses to different propositions using 5-point Likert scales to measure frequency ranging from "Never" to "Always". The quality of the relationship between the flight surgeon and the subject was based on the PDRQ-9 score and responses to questions about aspects of the flight surgeon's practice. The evaluation of the risk of the practice for flight safety was based on the self-medication rate in the 8 h preceding a flight, experience of any ADR on the ground or in flight after medication consumption, and an open-ended question on the existence, according to the subject, of drugs or drug classes that are incompatible with flight.

Procedures

The questionnaire was created and published with Sphinx© iQ2 version software (Le Sphinx Développement, Chavanod, France). A hyperlink to the questionnaire was sent electronically to the administration office of the FAF units for distribution to their aircrews. Follow-up e-mails were sent every 4 wk

via their administration office. Corresponding flight surgeons were designated in every center to present the study to the fighter aircrews in their charge and to monitor it, including sending the follow-up e-mails.

Statistical Analyses

Descriptive statistical analyses and univariate analyses were performed using Epi-info™ 7.2 version software (Center for Disease Control and Prevention, Atlanta, GA, USA). Quantitative variables with a normal distribution were described by mean and standard deviation, quantitative variables with a non-normal distribution were presented by median and first-third interquartile range, and qualitative variables by frequency and percentage. Tests of statistical association were performed in a two-sided situation. For quantitative variables, the Student's *t*-test was used, or nonparametric tests in case of nonhomogeneous variances in the Bartlett test (Kruskal-Walis or Mann-Whitney tests). For categorical variables, a Chi-squared test, or a Fisher's exact test if the numbers were insufficient, was used. A result was considered significant if the *P*-value was less than 0.05. Multivariate analysis was performed using the R 3.6.0 version software (R Foundation for Statistical Computing, Vienna, Austria). Binomial logistic regression was performed for the primary endpoint, where the variable to be explained was the frequency of "rare or absent" or "more frequent" self-medication. Variables significant up to 0.2 in the univariate association analyses were added to the model, and then a stepwise selection (backward selection) was performed until the final model with variables significant at the 0.05 level was obtained.

RESULTS

Between March and November 2020, 204 completed surveys were collected, of which 170 could be included and analyzed (**Fig. 1**). Based on their local files, the corresponding flight surgeons estimated the overall sampling frame to be 495–510 fighter aircrews in the FAF flying units. The participation rate was therefore estimated at 33–34%. The median time to complete the questionnaire was 13 min (IQR 9–19). The frequency of self-medication in 13 identified clinical situations is presented in **Fig. 2**. Only 4 out of the 170 fighter aircrews answered "Never" to each situation, which means an absolute rate of self-medication of 97.6%. Two groups were identified according to the value of the mean score for the frequency of self-medication in these 13 clinical situations: the "Rare or no self-medication" group, which included 91 subjects (53.5%), and the "More frequent self-medication" group, which included 79 subjects (46.5%).

In our study, none of the socio-demographic, occupational, or medical characteristics sought were associated with greater self-medication practice in the univariate analysis (**Table I**). As expected, a small number of fighter aircrews reported regular treatment ($N = 12$). Regarding medications, three drugs were reported in the "Rare or no self-medication" group (desloratadine $N = 1$, bilastine $N = 1$, and zinc $N = 1$) and nine in the

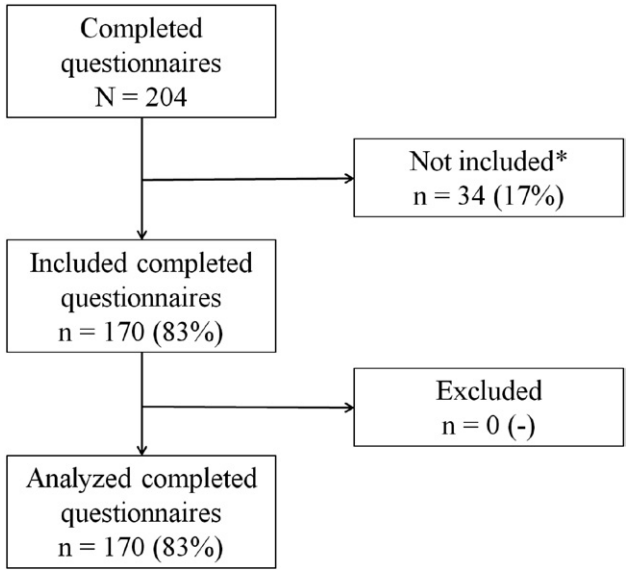


Fig. 1. Flowchart. *Did not volunteer to participate in the study ($N = 13$); "subscription" aeronautical activity ($N = 10$); assigned to a unit not belonging to one of the three command chains including a fighter aviation component ($N = 5$); no "fighter pilot" or "combat weapon system navigator" function ($N = 4$); assigned unit not located in metropolitan France ($N = 1$); belonged to an FAF Presentation Team ($N = 1$).

"More frequent self-medication" group (desloratadine $N = 3$, levocetirizine $N = 1$, nonspecified antihistamine drug $N = 1$, finasteride $N = 1$, levothyroxine $N = 1$, and *Phleum pratense* $N = 1$). Many opinions about health were associated with a more frequent practice of self-medication, including the "perception of its own health", the attention paid to various points of lifestyle, and some opinions on health issues (**Table II**).

The most popular attitude when faced with a common health problem was to "wait for it to spontaneously disappear". When advice was sought in such cases, the main interlocutors were "family and friends", especially when they were "health professionals" (**Fig. 3**). The attitudes and practices of a subject facing a common health problem were not associated with a more frequent practice of self-medication, except for the practice of seeking informal advice from "family and friends" ($P = 0.005$) or a "relative who is a health professional" ($P = 0.02$).

In this study, overall confidence in the healthcare community was high, regardless of the health professional considered. Concerning the flight surgeons, the subjects declared that they were generally confident in their "medical capacities", their "ability to understand professional constraints", and their "ability to judge of their fitness to fly". However, the confidence in the "ability to tolerate a mild amount of risk for the flight fitness decisions", while still present, seemed to be more mixed among all respondents (**Fig. 4**). None of these factors were associated with a more frequent practice of self-medication, except for the confidence in the "specialist physicians in general" ($P = 0.03$). The value of the PDRQ-9 score applied to the flight surgeons was not associated with greater self-medication (35.11 ± 7.40 in the "Rare or no self-medication" group vs. 34.34 ± 6.93 in the "More frequent self-medication" group, $P = 0.49$).

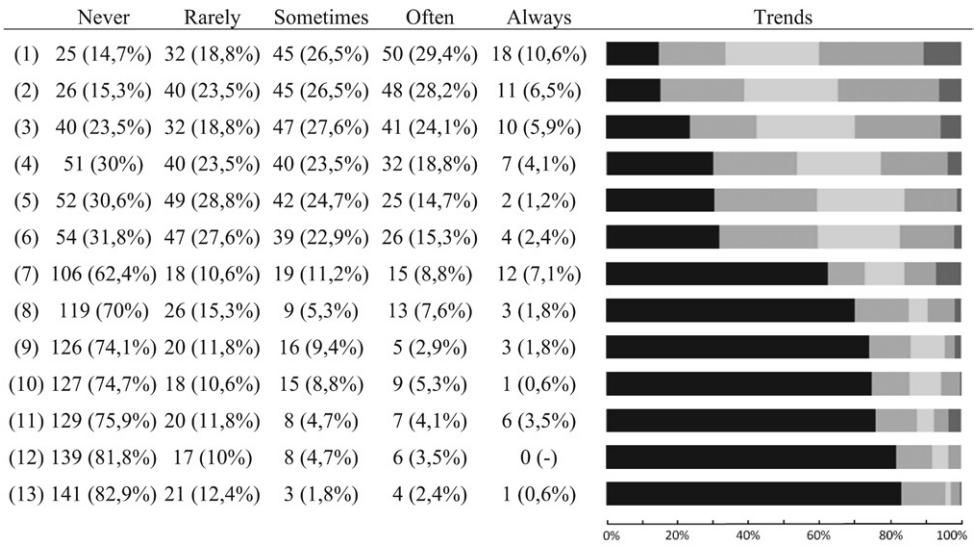


Fig. 2. Frequency of self-medication by clinical situation (*N* = 170). 1: Pain; 2: rhinopharyngitis symptoms; 3: odynophagia; 4: cough; 5: flu-like symptoms; 6: gastroenteritis symptoms; 7: allergic symptoms; 8: dermatological symptoms; 9: sleep disturbances or anxiety; 10: constipation; 11: common infections; 12: ophthalmic symptoms; 13: ear symptoms.

In total, the data suggests that being over 35 yr of age, compared with the 30–35 age group, and not assuming to be "the best person to know what medications are right for you", was associated with less frequent self-medication in the multivariate analysis. On the other hand, being a pilot, taking a regular treatment, lacking intentionality toward "getting enough sleep", and having a high "confidence in the medical profession" were associated with more frequent self-medication. Symptoms of "pain", "rhinopharyngitis", "gastroenteritis", and "odynophagia" were also associated with more frequent self-medication (**Table III**).

Table I. Characteristics of the Included Respondents (*N* = 170).

	RARE OR NO SELF-MEDICATION (*N* = 91)		MORE FREQUENT SELF-MEDICATION (*N* = 79)		*P*-VALUE
Socio-demographic characteristics					
Male gender	89	(97.8%)	77	(97.5%)	1.00*
Age groups					0.22
≤30 yr old	22	(24.2%)	17	(21.5%)	
30–35 yr old	27	(29.7%)	35	(44.3%)	
35–40 yr old	26	(28.6%)	20	(25.3%)	
>40 yr old	16	(17.6%)	7	(8.9%)	
Professional characteristics					
Seniority in the French Air Force (yr)	15 ± 5.6 (3–28)		14 ± 5.1 (5–30)		0.54
Total flight hours (h)	2068 ± 1124 (180–4500)		1974 ± 989 (350–5200)		0.57
Mode of recruitment					0.14
External / Career Aircrew	36	(39.6%)	42	(53.2%)	
External / Contract Aircrew	53	(58.2%)	34	(43%)	
Internal recruitment	2	(2.2%)	3	(3.8%)	
Type of aircraft					0.29
Dassault Rafale	26	(28.6%)	30	(38%)	
Dassault Mirage 2000	47	(51.6%)	39	(49.4%)	
Dassault-Dornier Alphajet	18	(19.8%)	10	(12.7%)	
Function on board					0.25
Pilot	67	(73.6%)	65	(82.3%)	
Combat systems officer	24	(26.4%)	14	(17.7%)	
Higher qualification					0.67
Junior Pilot or CSO	10	(11%)	10	(12.7%)	
Operational Pilot or CSO	10	(11%)	5	(6.3%)	
Deputy Patrol Leader or Deputy Chief CSO	14	(15.4%)	10	(12.7%)	
Patrol Leader or Chief CSO	57	(62.6%)	54	(68.4%)	
Medical data					
To have a civilian treating physician	37	(40.7%)	36	(45.6%)	0.62
To have a regular treatment	3	(3.3%)	9	(11.4%)	0.08

CSO: Combat Systems Officer.
*Use of nonparametric tests.

Table II. Opinions on Health Issues by Frequency of Self-Medication (*N* = 170).

	RARE OR NO SELF-MEDICATION (*N* = 91)	MORE FREQUENT SELF-MEDICATION (*N* = 79)	*P*-VALUE
Assessment of the quality of health status			
Overall perception of health	4.27 ± 0.68 (2–5)	4.13 ± 0.74 (2–5)	0.18
I believe that I get sick more easily than others	1.44 ± 0.75 (1–4)	1.68 ± 0.83 (1–4)	0.04
My health is as good as the people I know	3.77 ± 0.97 (1–5)	3.86 ± 0.87 (2–5)	0.52
I expect my health to get worse	1.90 ± 1.09 (1–5)	2.14 ± 1.15 (1–5)	0.17
My health is excellent	4.26 ± 0.74 (2–5)	4.00 ± 0.99 (1–5)	0.11*
Attention paid to healthy lifestyle			
Not overindulging	4.11 ± 0.92 (2–5)	3.77 ± 0.89 (1–5)	0.02
Balance of the diet	4.21 ± 0.71 (2–5)	4.01 ± 0.88 (2–5)	0.11
Hygiene rules	4.36 ± 0.69 (2–5)	4.10 ± 0.73 (2–5)	0.02
Attention to sleep	4.11 ± 0.77 (2–5)	3.80 ± 0.93 (2–5)	0.02
Regular physical activity	4.01 ± 1.03 (1–5)	3.75 ± 0.95 (2–5)	0.09
Average attention paid to a healthy lifestyle**	4.16 ± 0.55 (2.6–4.2)	3.89 ± 0.58 (2.2–4.0)	0.002
Opinions on health issues			
It is important to learn about your symptoms	3.23 ± 0.84 (2–5)	3.16 ± 1.06 (1–5)	0.97*
Doctors tend to over-prescribe medications	3.13 ± 0.99 (1–5)	2.87 ± 1.04 (1–5)	0.10
You are the best person to know which medication is best for you	1.71 ± 0.65 (1–5)	1.89 ± 0.88 (1–4)	0.19
You are taking too much medication	1.32 ± 0.59 (1–3)	1.68 ± 0.94 (1–5)	<0.01

*Use of nonparametric tests;
**Arithmetic mean of the scores obtained in the previous questions.

The most commonly used self-medication drugs are available in **Table IV**. The participants reported 97 drugs for self-medication (6.7 drugs per person on average) and 49 drugs in the 8 h preceding a flight (2.1 drugs per person on average). Moreover, an increased practice of self-medication for a common health problem was associated with taking a drug in the 8 h preceding a flight [OR = 2.84 (1.52–5.31), $P < 0.001$]. Regarding other specific points for flight safety, 10.2% declared that they never read the "instructions for use of the medication", 3.6% for the "dosage of the medication", 6% for the "expiration date", and

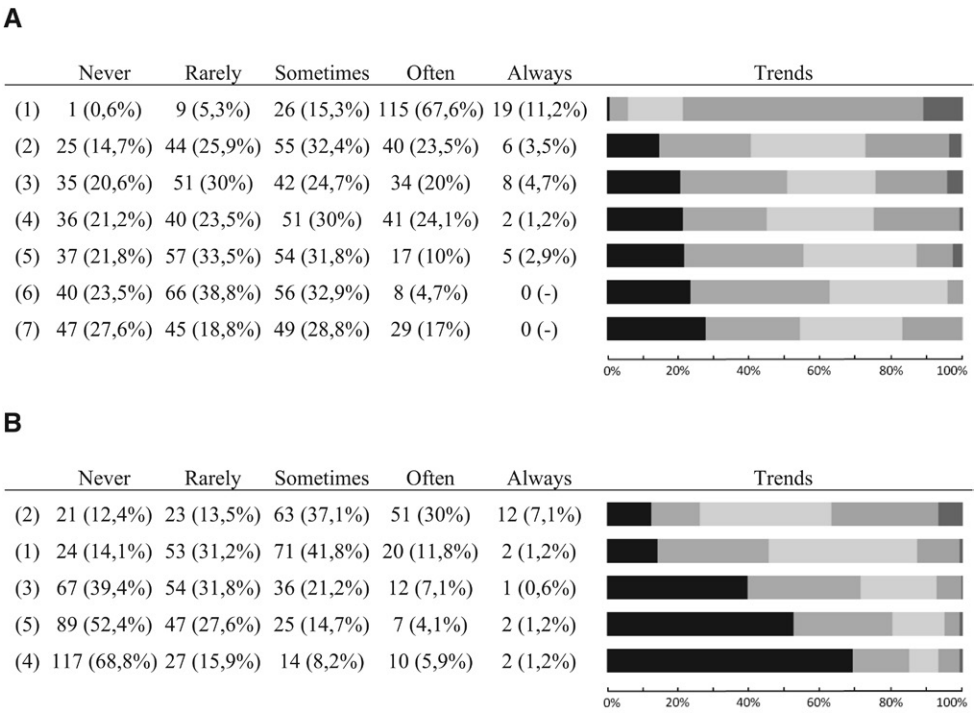
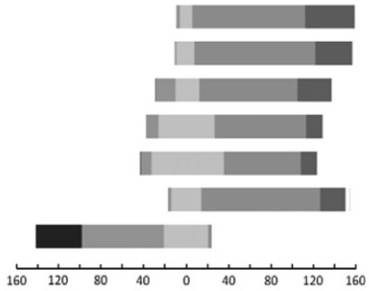


Fig. 3. A) Attitudes toward a common health problem. 1: to wait for it to spontaneously disappear; 2: to make an appointment with a flight surgeon; 3: to use non-medication methods; 4: to take over-the-counter medication; 5: to make an appointment with a civilian general practitioner; 6: to make an appointment with another health care professional; 7: to use a medication from a personal pharmacy. B) Practices of seeking informal advice for a common health problem (*N* = 170). 1: a relative who is a health care professional; 2: a relative who has experienced similar symptoms; 3: a pharmacist; 4: a flight surgeon outside the consultation setting; 5: a civilian general practitioner outside the consultation setting.

A

	Not confident	Rather not confident	Neutral	Rather confident	Totally confident
(1)	0 (-)	3 (1,8%)	12 (7,1%)	107 (62,9%)	48 (28,2%)
(2)	0 (-)	2 (1,2%)	17 (10%)	115 (67,6%)	36 (21,2%)
(3)	1 (0,6%)	19 (11,2%)	23 (13,5%)	93 (54,7%)	34 (20%)
(4)	0 (-)	13 (7,6%)	53 (31,2%)	87 (51,2%)	17 (10%)
(5)	1 (0,6%)	10 (5,9%)	69 (40,6%)	73 (42,9%)	17 (10%)
(6)	0 (-)	3 (1,8%)	29 (17,1%)	113 (66,5%)	25 (14,7%)
(7)	45 (26,5%)	78 (45,9%)	42 (24,7%)	4 (2,4%)	1 (0,6%)

Trends



B

	Not confident	Rather not confident	Neutral	Rather confident	Totally confident
(1)	3 (1,8%)	12 (7,1%)	20 (11,8%)	88 (51,8%)	47 (27,6%)
(2)	3 (1,8%)	16 (9,4%)	18 (10,6%)	72 (42,4%)	61 (35,9%)
(3)	6 (3,5%)	20 (11,8%)	36 (21,2%)	68 (40%)	40 (23,5%)
(4)	22 (12,9%)	28 (16,5%)	38 (22,4%)	55 (32,4%)	27 (15,9%)

Trends

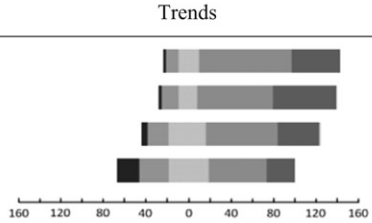


Fig. 4. A) Overall confidence in the healthcare community. 1: Specialist physicians in general; 2: civilian general practitioners; 3: flight surgeons; 4: pharmacists; 5: nurses; 6: specialists in physical and manual medicine (physiotherapists, osteopaths, etc.); 7: websites specializing in health. B) Confidence in the skills of the flight surgeon ($N = 170$). 1: Medical abilities; 2: ability to understand professional constraints; 3: ability to judge fitness the fly; 4: ability to tolerate a mild amount of risk in flight fitness decisions.

10.6% for the "specific pictogram related to the risk for driving". Among the respondents, 11.2% of the subjects had already experienced adverse drug reactions on the ground and 1.8% in flight. Finally, 93.5% of the respondents believed that there were "medications that were incompatible with flight".

DISCUSSION

The data returned in this study suggest the self-medication rate may be as high as 97.6% of the FAF fighter aircrews. However, this practice does not seem to be very common since the

Table III. Explanatory Model of Self-Medication in the FAF Aircrew Population ($N = 170$).

	OR (IC 95%)	*P*-VALUE
Socio-demographic characteristics		
Age groups		0.01
Less than 30 yr old	0.84 (0.26–2.74)	
30 to 35 yr old	Reference	
35 to 40 yr old	0.27 (0.09–0.78)	
More than 40 yr old	0.15 (0.03–0.59)	
Professional characteristics		
Function of pilot	2.99 (1.08–8.93)	0.04
Medical data		
Taking a regular treatment	5.65 (1.13–36.6)	0.04
Opinions regarding health questions		
Lacking intentionality toward "getting enough sleep"*	3.17 (1.16–9.27)	0.02
Not assuming to be the best person to know what medications are right for you**	0.15 (0.03–0.6)	<0.01
Trust in health care professionals		
High confidence in the medical profession***	4.70 (1.65–14.97)	<0.01
Clinical situations		
Pain	3.49 (1.13–11.82)	0.03
Symptoms of rhinopharyngitis	3.19 (1.19–8.85)	0.02
Odynophagia	5.69 (2.24–15.42)	<0.001
Symptoms of gastroenteritis	2.68 (1.15–6.44)	0.02

*Includes "Strongly Disagree", "Disagree" and "Neutral" responses to the statement "I pay particular attention to getting enough sleep"; **includes "Strongly Disagree" and "Disagree" responses to the statement "You think that you are the best person to know what medications are right for you"; ***mean confidence in specialist physicians, civilian treating physicians, and flight surgeon over 3/5.

Table IV. Ranking of the 20 Most Used Self-Medication Drugs by the Subjects.

	IN GENERAL (*N* = 166)			IN THE 8 h PRECEDING A FLIGHT (*N* = 78)		
	INN	ROUTE OF ADMINISTRATION	NUMBER (%)	INN	ROUTE OF ADMINISTRATION	NUMBER (%)
1	Paracetamol	Oral	219 (132%)*	Paracetamol	Oral	59 (76%)
2	Pseudoephedrine	Oral	71 (43%)	Ibuprofen	Oral	12 (15%)
3	Ibuprofen	Oral	59 (36%)	Doesn't remember	N/A	8 (10%)
4	Amylmetacresol	Oral	50 (30%)	Pseudoephedrine	Oral	8 (10%)
5	Diosmectite	Oral	47 (28%)	Niflumic acid	Dermal	4 (5%)
6	Cetylpyridinium	Oral	42 (25%)	Prednisolone	Nasal	4 (5%)
7	Lysozyme	Oral	42 (25%)	Diosmectite	Oral	4 (5%)
8	Niflumic acid	Dermal	38 (23%)	Loperamide	Oral	4 (5%)
9	Phloroglucinol	Oral	37 (22%)	Phloroglucinol	Oral	4 (5%)
10	Diclofenac	Oral	34 (20%)	Non specified nasal spray	Nasal	3 (4%)
11	Loperamide	Oral	31 (19%)	Oxymetazoline	Nasal	3 (4%)
12	Chlorhexidine	Oral	29 (17%)	Salt water nasal spray	Nasal	3 (4%)
13	Tetracaine	Oral	29 (17%)	Desloratadine	Oral	3 (4%)
14	Ascorbic acid	Oral	26 (16%)	Racecadotril	Oral	3 (4%)
15	Tripolidine	Oral	26 (16%)	Tripolidine	Oral	3 (4%)
16	Desloratadine	Oral	24 (14%)	Betamethasone	Dermal	2 (3%)
17	Oxymetazoline	Nasal	20 (12%)	Essential oils	Nasal	2 (3%)
18	Prednisolone	Nasal	20 (12%)	Camphre	Nasal	2 (3%)
19	Pheniramine	Oral	19 (11%)	Ascorbic acid	Oral	2 (3%)
20	Oxomemazine	Oral	18 (11%)	Alpha-amylase	Oral	2 (3%)

INN: International nonproprietary name; N/A: Not Applicable.
*Total greater than 100%: multiple medications per person, and fixed combination of drugs including paracetamol.

frequency of this recourse was low or absent in 53.5% of cases. Two cross-sectional surveys conducted in 1989 and 1996 among 36 and 57 fighter pilots of the French Navy reported a self-medication rate of 33–42% on land and 24–26% at sea.[13,14] Another cross-sectional survey conducted in 1997 in a French aeromedical center reported a self-medication rate of 71% in 52 fighter pilots.[10] The largest cross-sectional survey conducted in 2009 in 3 French aeromedical centers reported a self-medication rate of 56.3% in 1316 military and civilian pilots of all specialties.[6] However, in this survey, the aircrew populations were very heterogeneous in terms of employment, aeronautical constraints, and medical requirements for flight fitness. Since the results were based on their entire sample rather than subgroups, this difference in self-medication rate could be explained by this heterogeneity. In all cases, there is obviously a great variability in the proportions of self-medication in this population. This could be explained by changes in attitudes and practices over the past decades, but it may also be explained by the different ways in which data was collected in the various studies. In this study, the choice was made to have the questionnaire filled out in the squadrons and not in the medical units or in the aeromedical centers in order to avoid any prevarication bias. Even if anonymity was always guaranteed during these different studies, this method of collection has allowed the completion of the questionnaire to be more effectively separated from any second thoughts about fitness to fly.

A typical profile of the fighter aircrew member practicing self-medication more frequently could be identified from the study's data: a pilot under 35 yr of age, taking a "regular prescription", lacking intentionality toward "getting enough sleep", trusting the "medical profession", and thinking that he/she is the "best person to know which medication is right for him/her". This practice would be more frequent if the common health problems were symptoms of "pain", "rhinopharyngitis", "odynophagia", or "gastroenteritis". However, beyond identifying the potential target for prevention actions, this emphasizes the complex interactions that might exist between many explanatory factors. This typical profile fits the data well in statistical terms, but other factors of interest may be missing.

Being over 35 yr old was independently associated with less frequent self-medication, compared with the 30–35 yr old age group. However, previous data among French pilots of all specialties had shown those who were 30–40 yr old practiced self-medication more than other age groups.[6] A similar trend was also observed in divers, in whom an age greater than 39 was associated with a higher consumption of drugs in the 6 h before a dive.[5] In the French population, even if there does not seem to be a threshold, an age above 60 seems to be associated with a less frequent practice of self-medication in comparison with lower age groups.[11,16] Since fighter aircrews are required to follow a narrow progression slope in their qualifications, any flight interruption may have severe consequences on their career. Also, the qualification of "Patrol Leader" or "Chief Combat Systems Officer" is typically achieved between the ages of 30 and 35. The hypothesis could be that the younger fighter aircrews may prefer to use self-medication when facing a common health problem rather than making an appointment with a flight surgeon. The fear of unfitness to fly has already been pointed out as an important reason for not consulting a flight surgeon,[6] especially among the younger aircrews.[9] On the other hand, after age 35, a certain maturity through experience with the medical profession and a decrease in the "pressure to fly" would make it easier to consult a medical professional and thus reduce the need for self-medication.

These specificities in the relationship with the medical profession have already been suggested among French military aircrews of various specialties in a previous qualitative study.[9]

Other personal factors were also associated with more frequent self-medication, such as the function of "Fighter Pilot". No data in the literature had previously identified this factor. However, it should be noted that the majority of respondents were pilots (78%) and that the *P*-value for this factor was close to significance. Similarly, to have a "regular prescription" was also statistically associated with a more frequent practice of self-medication. Previous data in a representative cohort of the general French population in 2005 also found a statistically higher proportion of self-medication among subjects with a usual treatment or medical follow-up (44.2% vs. 39.4%, $P < 0.001$).[16] However, a very low number of fighter aircrews had a regular treatment in this cohort ($N = 12$) and the *P*-value was also close to significance at 0.047 on the multivariate model. Therefore, sampling fluctuations regarding these factors cannot be formally excluded.

The vast majority of respondents felt that they paid particular attention to various criteria related to lifestyle. More attention paid to this lifestyle was associated with less frequent practice of self-medication. The explanatory model also found that lacking intentionality toward "getting enough sleep" was associated with more frequent self-medication. There is little data on the relationship between lifestyle and self-medication. A Spanish general population study in 2006–2007 found that nights of less than 7 h sleep were associated with more frequent self-medication in men.[2]

Overall, trust in health professionals was high in our study. Higher trust in the medical profession was associated with more frequent self-medication. This result is unexpected since the scarce data from the literature on this topic are summarized in an Iranian bibliometric systematic review in 2014, which reported low trust in medical services (five studies) or lack of trust in physicians (three studies) as factors favoring the practice of self-medication.[12] The hypothesis could be that self-medication behaviors in this population relates to a mimicry of the management of physicians previously consulted for a similar common health problem. Trust in the medical profession would then be only a confounding factor in a more complex practice. The trust in the skills of the flight surgeons was globally high. The PDRQ-9 score, which measures the quality of the doctor-patient relationship in primary care,[15] was not associated with more frequent self-medication. This score was chosen for its ability to provide a brief measure of the therapeutic aspects of the patient-physician relationship in primary care. It may not be suitable for assessing the quality of the relationship between fighter aircrews and flight surgeons. However, it should be noted that the absolute values of the scores obtained in this study are in a low range compared to other populations where this score has been validated.[8,15,18] Although no threshold has been established to define a good or poor relationship, the quality of the relationship between fighter aircrews and flight surgeons is questionable. It is possible that an obstacle relates to the confidence in the "ability to tolerate a mild amount of risk in flight fitness decisions", but this could be the subject of a separate work.

Some common health problems also had an impact on the frequency of self-medication. Symptoms of "pain", "nasopharyngitis", "odynophagia" and "gastroenteritis" were associated with more frequent self-medication in this study. In studies on aircrews, pain (including headache, otalgia, odontalgia, and gastralgia) had previously been identified as associated with greater self-medication practice,[6,10,13,14] as well as upper respiratory infections,[10,13,14] diarrhea,[10,14] and dermatoses.[14] In addition, a study on scuba divers, a profession also controlled for safety, found a similar risk factor for self-medication with symptoms of pain and upper respiratory infections.[5]

The impact of self-medication on flight safety is related to the risk of ADR that may occur in flight and may induce sudden or subtle incapacitation. The rate of reported in-flight ADR in this study was 1.8%, which is consistent with previous data that found a rate of 1.7%[6] to 4.5%.[10] The practice of self-medication in the 8 h preceding a flight concerned 45.9% of fighter aircrews in the study. Previous data reported a rate of 44% among civilian and military aircrews.[6] Among divers, self-medication accounted for 57% of the studied population in the 6 h before a dive.[3] In addition, an increased practice of self-medication for a common health problem was associated with taking a drug in the 8 h preceding a flight [OR = 2.84 (1.52–5.31), $P < 0.001$]. Among the 20 drugs most frequently used in the 8 h preceding a flight, "paracetamol" was predominant, but there were also two vasoconstrictors, one nonsteroidal anti-inflammatory drug, and two antihistamine drugs, families of drugs with cardiovascular, digestive, or neurosensory ADR that may be frequent. Similar trends were already reported in previous data among pilots of all specialties.[6] In our study, 22.9% of the subjects declared that they "rarely" (or "never") read the "specific pictogram concerning the risk for driving" and 25.3% the "instructions inside the package". Previous data had shown that 65.3% of civilian and military aircrews were aware of these pictograms, but that 27.6% of them did not systematically look for them and that half of them would not systematically stop taking the medication despite the orange or red logos.[6] However, 93.5% of the fighter aircrews in this study believed that there were medications that were "incompatible with flying". In the literature, 85% of pilots seemed to be aware of the potential dangers of medication, but only 39% were able to name one or more incompatible medications.[10] In total, the impact of self-medication on flight safety remains uncertain. On the one hand, the fact that taking medication may be incompatible with flying seems to be a well-accepted concept and the rate of undesirable effects experienced in flight is low. On the other hand, the number of fighter pilots having already resorted to self-medication in the 8 h preceding a flight was high in this study, some of the drugs consumed have undesirable effects that can occur frequently, and the measures aimed at improving the safety of the intake are not unanimously followed. Therefore, a detailed conclusion of the impact of self-medication on flight safety cannot be inferred from this data.

This study suffers from several limitations that may affect the interpretation of the collected data. First, the participation rate was estimated at 33–34%, i.e., about one-third of the fighter aircrews in the FAF flying operational units, which could imply a lack of power in identifying or excluding explanatory factors for the practice of self-medication. This low return rate may be attributed to the time needed to fill out the questionnaire that might be imagined or considered to be too long. Since the trust in health professionals was high in the results and unexpectedly associated with greater self-medication, we might hypothesize that primarily those with a higher trust were more likely to complete the questionnaire. We may also hypothesize that fighter aircrew favorable to self-medication might be overrepresented, since it would have been the opportunity to let their physicians know it anonymously. On the contrary, another hypothesis could be that the nonrespondents did not want to let others know of their practice of self-medication, maybe because of doubts about anonymity. Thus, a selection bias cannot be excluded, which might be supported by the proportion of fighter aircrews flying a Dassault Rafale of 33% against 50% expected at the time of the study design. A recall bias, usual in retrospective studies, also cannot be ruled out. For example, 21.2% of the aircrews answered that they "never" used "non-prescription drugs purchased for the current health problem" and 27.6% that they "never" used a "drug from their personal pharmacy" when the question was asked directly. But when the same question was asked indirectly by putting the subjects in a situation with different common health problems, only 2.4% of the subjects answered that they "never" practiced self-medication in all 13 of those clinical situations. From a methodological point of view, the use of parametric tests on Likert scales by assigning a numerical value to the different propositions has been the subject of controversy, particularly concerning the interpretation of the intermediate values or the validity of the equivalence between two propositions.[7] Nevertheless, other data highlight the robustness of these tests, and this method now seems to be well accepted.[17] Despite all of these limitations, this is the first multicenter study specifically seeking to identify factors associated with more frequent self-medication in this specific population, and the factors identified should probably be considered for future work on this topic. However, the generalization of these results to the entire FAF fighter aircrew population should be done with caution. Further precautions should be taken when transposing these results to foreign fighter aircrew populations because of possible confounding legal and cultural factors.

In conclusion, for the aircrew who responded to this study, almost all of the FAF fighter jet aircrews have already used self-medication when facing a common health problem, but the frequency of its use is not systematic. With some findings consistent with previous data, this practice appears to be the result of complex interactions between many explanatory factors, including personal characteristics, opinions, attitudes, and practices when facing a common health problem. Yet the impact of self-medication on flight safety still raises concerns. These results are likely to be of interest for the development of targeted prevention messages. In particular, they could be used as the basis for instructing flight surgeons during their initial and postgraduate education, fighter aircrews during aeromedical instructions or consultations, and FAF decision makers.

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