

Tobacco-alcohol consumption, socio-sanitary profile and factors influencing the anthropometric and cardiorespiratory parameters of Kinshasa smokers

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Abstract

Objective: To determine the prevalence of alcoholism and the influence of the associated «tobacco-alcohol» consumption on the anthropometric and cardiorespiratory parameters of some smokers in Kinshasa.

Material and Method: Cross-sectional and prospective study, conducted in Kinshasa from January to October 2017, including 120 tobacco smokers with at least 5 years of service, with a mean age of 36 ± 9 years. The Global Tobacco Surveillance System (GTSS) Validated Adult Tobacco Surveillance Questionnaire has been adapted and used. Socio-demographic, anthropometric, cardiorespiratory parameters and behavioral of consumption were the variables of interest. At the $p \leq 0.05$ threshold, correlation and multiple linear regressions allowed for statistical inference.

Results: The sex ratio was 19/1 (M / F), 84.2% of the smokers were alcoholics. The median seniority in smoking and alcohol consumption was 8 years. The median amount of tobacco consumed was 27 pack-years; it was positively correlated with the amount of alcohol consumed, the oldest in smoking and alcoholism. The BMI of smokers was influenced by seniority in smoking and the amount of alcohol consumed ($R^2 = 0.049$, $p < 0.001$). RR rest was influenced by the amount smoked, seniority in tobacco and alcohol ($R^2 = 0.187$, $p < 0.001$). While the DBP was influenced by age, the amount of smoked tobacco, alcohol consumed as well as seniority in smoking and alcoholism ($R^2 = 0.102$, $p < 0.001$).

Conclusion: The prevalence of alcoholism is very high in Kinshasa smokers; this association "tobacco-alcohol" has an influence on their BMI, RR rest and DBP.

Key words: Body mass index, blood pressure, respiratory rate, smoking, alcoholism, Kinshasa

Introduction

Tobacco kills, it currently causes more than six million deaths each year and will probably cause more than eight million by 2030 (1-3). Since the 16th century, tobacco was described as a grass huge therapeutic virtue by Jean Nicot and was long used to treat nausea, migraine, wounds, the art sores and rheumatism (4). Today, apart from the mortality attributed to it, tobacco consumption is also implicated in comorbidities and the severity of diseases in adults (1, 5, 6).

Regardless of the mode of consumption (chewed, snorted, smoked, hookah, etc.) (7, 8), the consequences of tobacco consumption are the same (1, 9, 10) and are directly proportional to the consumption, number of years of smoking, and sedentary lifestyle (1, 6, 11-13). Since tobacco is a risk factor for many chronic diseases, its pejorative effects on the respiratory, cardiovascular and metabolic systems are demonstrated (1,5,6). Although the biochemical mechanism of its deleterious effects is not always well understood (5, 6,11,12);

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Physiologically, tobacco alters blood lipids, increases heart rate and blood pressure, decreases weight and body mass index (8,12,14,15). In addition, smoking is found to be associated with higher alcohol consumption (16), and despite lower purchasing power, this association " tobacco-alcohol " is mainly observed among youth, workers s e qualified and unemployed (2,3,17-20).

In the world, it is now estimated that 49% of under-qualified workers are regular smokers, the majority of tobacco users live in low-income countries whose populations pay the highest price for tobacco misdeeds (1.3%). Tobacco use is struggling to decline in European countries where 28% of the population is still smokers (21). In Africa, where 25% of the population smoke (2,21), this prevalence varies widely depending on the population's purchasing power (22). In the countries south of the Sahara, 5 to 47% of the population smoke (23).

In the Democratic Republic of Congo (DRC), there is less than 20% of smokers, this prevalence varies according to sex, age and environment : 10 to 26% of men and less than 10% of women ; 29% of 12- to 16-year-old schoolchildren in Kinshasa (2).

In the DRC, moreover, studies on tobacco are rare, there is no data neither on the consumption behavior «tobacco-alcohol»; nor on the amount of tobacco consumed and their influence on physiological parameters (2,22). The majority of the studies conducted in Congo or Kinshasa smokers being essentially epidemiological and clinical (24-28), they do not provide sufficient information on the interrelation of consumption "alcohol-tobacco", neither on the general characteristics, weight and changes in the cardiovascular and respiratory parameters of smokers, and even less on their determinants.

This study aims to describe the general characteristics of Kinshasa smokers, their smoking behavior in association with alcohol consumption, in order to find their influences on anthropometric, cardiovascular and respiratory parameters. Observations made may direct medical attitudes to smokers in Congolese or even African clinical settings and, where appropriate, motivate smoker surveillance strategies.

Material and Methods

This transversal and prospective study took place in the city of Kinshasa, Democratic Republic of Congo, from January to October 2017. This study was accepted by the ethics committee of the Faculty of Medicine of the University of Kinshasa. Verbal consent to participate in the study was obtained.

Population and sampling: Our study population consists of active tobacco smokers and alcohol consumers living in the 4 districts of the city of Kinshasa. Recruitment was conducted randomly, with 200 active smokers at 50 per district enrolled. The inclusion criteria hereafter allowed to consider 120 active smokers:

- Voluntary membership in the study ;
- Be at least 18 years old and reside in the city of Kinshasa ;

- Being an active tobacco smoker for at least 5 years, not practicing a risky activity on the respiratory system.
- Not having any illness in the last trimester before the study ;
- Do not have a personal history of chronic disease or diagnosed and known cardiovascular disease.
- Do not have a physical disability.

Each participant was randomly selected to obtain a homogeneous distribution among the four districts of the city of Kinshasa.

Methodology

A data collection form was developed and adapted e from Tobacco Surveillance adult questionnaire Global Tobacco Surveillance System (GTSS) (1). This fact sheet asked the following information:

- Sex, age (in years), weight (kg) and height (cm).
- The municipality and the district of residence,
- The profession, the practice of sport and the consumption of alcoholic beverages.
- Tobacco consumption.
- Heart rate, resting respiratory rate, systolic and diastolic blood pressure.

The occupation was defined as the gainful occupation or job held by the smoker at least 20 hours per week for at least 6 months. Different socio-professional categories were listed: the unemployed (not working for 6 months); senior managers (clerical employees with a higher level of education); students ; technicians (worker or self-employed) ; sellers and traders ; low-level employees (supervisors, cleaners, cooks, carriers and security guards). The practice of physical activity and sport was defined as a physical activity (PA) or sports for fun or competition (including walking) for at least 60 minutes, once a week for at least six months. Alcohol consumption was described as the average weekly consumption of 5 bottles of beer, with or without wine or whiskey. The number of bottles consumed per week and the seniority (number of years) of consumption were considered. Tobacco consumption resumed the number of years of use, the amount consumed: the number of cigarettes smoked per day (c/d) and converted in pack-years (PY). The resting respiratory rate (RR) was taken at least three times in a subject sitting at rest for at least 5 minutes; it was not stated to the subject that the measurement of his respiratory rate was performed at this time. Three measurements of heart rate (HR) and systolic and diastolic blood pressures (SBP and DBP) (using a branded device OMRON®, model HEM-741CRELN2 (HEM-8705-WM) ReliOn) were obtained in a sitting position, at rest for at least 5 minutes, with an interval of 5 minutes between each measurement. The lowest value of each value was selected.

The existence of a history of respiratory disease was based on a diagnosed respiratory disease that required medical follow-up for more than one week, either on an outpatient basis or in hospital since the onset of smoking. Finally, the reported subjective evolution of weight (weight loss or weight gain) since the beginning of smoking was noted.

Statistical analysis: The statistical analysis was performed using IBM SPSS version 20.0 software. Qualitative data is presented in terms of frequency and percentage. After verifying the normality of the data, the results are presented either by the mean $\pm$ standard deviation (for age), or by the median (quartile interval: QI 25-75) for the other parameters. Simple correlations are indicated by a Spearman (r) correlation coefficient and (R²) determination and the factors influencing the anthropometry and physiology of Kinshasa smokers were studied by multiple linear regressions. Significant statistical relationships were considered at the CI $\leq$ 95 confidence interval ($p < 0.05$).

Ethical considerations: The data was collected, recorded, analyzed and interpreted in accordance with the Helsinki declaration on human manipulation of the World Medical Association (WMA). No incident related to the study was observed.

Results

General Characteristics of Kinshasa smokers

Of the 120 smokers studied, 95% were male, with a sex ratio of 1 woman to 19 men. The average age was 36 ± 9 years, range: [18-65 years]. Three-quarters of smokers (74.1%) were under 40 years of age, of which 30-39 years had the highest number of smokers (45.8%). Half of the smokers did not work (50%) and almost a quarter (23.3%) was students. With respect to their antecedents and habitus, 97.5% of smokers were sedentary (did not engage in physical activity or sports); 84.2% regularly consumed alcohol. However, only 2.5% of smokers reported having ever had a diagnosed respiratory illness, while almost half (48.3%) of smokers surveyed reported a significant decrease in body weight a few years after they started smoking (Table 1).

Quantity of tobacco and alcohol consumed by Kinshasa smokers

Table 2 shows that the median amount of smoked tobacco was 27 (QI 25-75: 1-53) pack-year, extreme: 7.2-144 pack-years. Half of smokers surveyed consume since 8 (QI: 1-17) years with a maximum of 40 years. Alcoholic smokers consumed alcohol for a median of 8 (QI: 0-16 years), the median of bottles consumed was 12 (QI: 3-21) per week.

The anthropometric and cardiopulmonary parameters of smokers in Kinshasa

Anthropometrically, Table 2 shows that half of smokers weighed less than 65 kg. The median BMI of smokers was 23 (QI: 20-26) Kg/m², 14% of smokers were lean and 62% had BMI in standards (Table 3). In terms of cardiorespiratory fitness, these smokers had a median resting FR of 24 (QI: 22-26) cycles per minute (cpm), of which 88% were in tachypnea at rest (RR $>$ 20 cpm); median HR of 80 (QI : 66-94) beats per minute (bpm) including 25% of tachycardia (HR $>$ 90bpm). The median was 110 SBP (QI: 90-130) mm Hg, 10% hypertensive, the elevated systolic (SBP $\geq$ 140mmHg), while the median was 90 DBP (QI: 70-110) mm Hg, 59% were high diastolic hypertension (DBP $>$ 90mmHg) (Tables 2 and 3).

Table 1: Profile by gender, age, physical activity, smoking habits and history of cardio-respiratory diseases

Characteristics	N = 120 (%)
Sex	
Male	114 (95)
Female	6 (5)
Age groups (years)	
18-29	34 (28.3)
30-39	55 (45.8)
40-49	18 (15)
50-59	9 (7.5)
≥ 60	4 (3.4)
Profession	
Without jobs	60 (50.0)
Senior executives	12 (10.0)
Students	28 (23.3)
Technicians	10 (8.3)
Sellers / traders	7 (5.8)
Low-level employees	3 (2.5)
Physical activity and sport	
Practice PAS	3 (2.5)
Do not practice PAS	117 (97.5)
Alcohol consumption	
Yes	101 (84.2)
No	19 (15.8)
ATCD of respiratory disease	
Yes	3 (2.5)
No	117 (97.5)
Observation of slimming	
Slimming observes	58 (48.3)
No slimming observes	62 (51.7)

Relation smoking and alcoholism

We found in this study, a positive correlation between the age of smoking and the amount of smoked tobacco (PY) $r = 0.524$ ($p < 0.001$). Regarding the alcoholism of these smokers, a positive correlation was also found between the amount of smoked tobacco (PY) and the number of weekly bottles of beer consumed $r = 0.419$ ($p < 0.001$), but also with the age of the smoker. Alcohol consumption $r = 0.488$ ($p < 0.001$). In addition, seniority in smoking was strongly correlated with that in alcoholism $r = 0.64$, ($p < 0.001$) (Table 4).

Factors Influencing IMC, DBP and RR

Table 5 shows that the body mass index was inversely influenced by the weekly amount of alcohol consumed ($p < 0.001$) and the age of tobacco consumption ($p < 0.003$). The diastolic blood pressure was positively influenced by age ($p < 0.001$), the amount of smoked tobacco ($p < 0.001$), the quantity of alcohol bottles consumed weekly ($p < 0.001$) and the age of consumption of tobacco ($p = 0.008$). It was negatively influenced by the age of alcohol consumption ($p < 0.001$) (Table 5). The frequency of rest was positively influenced by the age of alcohol consumption ($p < 0.001$), the amount of tobacco consumed ($p < 0.001$) and the age of smoking ($p < 0.001$) (Table 5).

Table 2: Description of smoking habits, alcoholics and anthropometric and haemodynamic parameters of Kinshasa smokers

Settings	N	Minimum - Maximum	Mean ± Standard deviation
Age	120	18-65	36 ± 9
Tobacco and alcohol			Median (IQ: 25-75)
Tobacco (stems / days)	120	2-40	12 (1-25)
Tobacco (packs-year)	120	7.2-144	27 (1-53)
Smoking seniority	120	5-40	8 (1-17)
Alcohol (bottles / week)	101	1-21	12 (3-21)
Alcoholism seniority	101	5-32	8 (0-16)
Anthropometric and cardio-respiratory parameters			
Weight	120	39-85	65 (56-74)
Height	120	100-192	168 (155-181)
BMI	120	16-29	23 (20-26)
RR	120	12-28	24 (22-26)
HR	120	65-105	80 (66-94)
SBP	120	90-160	110 (90-130)
DBP	120	60-130	90 (70-110)

BMI : Body mass index ; HR : Heart rate ; FR : Resting respiratory rate ; PAD : diastolic blood pressure ; SBP : systolic blood pressure.

Table 3: Categorization of Anthropometric and Hemodynamic Parameters of Tobacco Smokers in Kinshasa

Settings	N = 120 (%)
Weight	
≤59 Kg	21 (18)
60-79 Kg	92 (77)
≥80 Kg	7 (6)
BMI	
<18.5 Kg / m ²	17 (14)
18.5-24.9 Kg / m ²	75 (62)
≥25 Kg / m ²	28 (23)
RR	
≤19 cpm	14 (12)
≥20 cpm	106 (88)
HR	
≤ 89 bpm	90 (75)
≥ 90 bpm	30 (25)
SBP	
≤ 139 mm Hg	108 (90)
≥ 140 mm Hg	12 (10)
DBP	
≤ 89 mm Hg	49 (41)
≥ 90 mm Hg	71 (59)

cpm : cycles per minute ; bpm : beats per minute.

Table 4: Correlation of substances usually consumed.

Correlation	R	p <
Tobacco (PY) / Alcohol (bottles / week)	0419	0.001 *
Tobacco (PY) / Alcohol seniority	0488	0.001 *
Tobacco (PY) / Tobacco seniority	0524	0.001 *
Tobacco seniority / Alcohol seniority	0641	0.001 *

* significant p; PY: pack-years

Table 5: The influencing factors anthropometric and cardiorespiratory parameters of smoking Kinshasa

Regression equation	validity of the regression model					
	coefficient	P	r	R ²	F	p value
Body mass index						
Constant	24252	0.001 *				
Age	0098	0.455				
Alcohol (bottles / week)	-0074	0.001 *	0208	0049	9544	0.000 ^a
Alcohol seniority	-0.01	0.636				
Tobacco (PY)	-0015	0.238				
Age of smoking	-0057	0.003 *				
Diastolic Blood Pressure						
Constant	76584	0.001 *				
Age	2.484	0.001 *				
Alcohol (bottles / week)	2878	0.001 *	0319	0102	23877	0.000 ^a
Alcohol seniority	3499	0.001 *				
Tobacco (PY)	2259	0.001 *				
Age of smoking	1886	0.008 *				
Respiratory rate rest						
Constant	20366	0.001 *				
Age	-0181	0.104				
Alcohol (bottles / week)	-0033	0.061	0433	0187	48.53	0.000 ^a
Alcohol seniority	0134	0.001 *				
Tobacco (PY)	0083	0.001 *				
Age of smoking	0054	0.001 *				

* significant p; ^a valid regression model; PY: pack-years

Discussion

The characteristics of smokers: Our study conducted on some active smokers in Kinshasa, aimed to determine the general characteristics of Kinshasa smokers, the prevalence of alcohol consumption, as well as the factors influencing their anthropometry and physiological parameters. The result is a dominance of men, youth and non-workers among the smokers studied. Several African publications corroborate our findings, stating that men and young people between the ages of 20 and 35 are the most likely to smoke (2,20,23,26). Theoretically, one of the effects sought by tobacco consumption is that of reducing stress, ascribed to one of its components, nicotine; Tobacco use therefore seems to grant physical, psychological and spiritual well-being; it gives a good image of oneself (29,30). It is thus possible that men and young people, being more socially active and more exposed to stress (17,31), consume more tobacco, certainly in search of these virtues in order to alleviate the stress related to their daily life. . Studies in North America and Europe also report that these two groups are the most smoking tobacco categories (3,5,17,29,31). However, in contrast to North American and European data, where it is workers and lower-level workers who are the most likely to smoke, in Kinshasa, a significant proportion of unemployed people are reported to be smokers (2,9,32). This difference in socio-occupational status between Kinshasa smokers and those from elsewhere is certainly due to the high unemployment rate observed in the Kinshasa population, from which the sample of the study was taken (32,33).

Behavior, antecedents and factors influencing the anthropometric and cardiorespiratory parameters of Kinshasa smokers

Regarding the practice of physical activities and sports (PAS), almost all smokers in Kinshasa do not practice PAS. Several publications indicate that smoking potentiates the effects of physical activity, increases energy expenditure and has the same effects on the body (well-being) as PAS alone (12, 30). Thus, tobacco users already observing these effects would no longer feel the need to practice PAS. In addition, PAS practice reduces smoking and speeds smoking cessation; smoking is mainly linked to a sedentary lifestyle (34). It is therefore difficult to find a significant number of PAS practitioners in a population of smokers, corroborating the observation made in our series.

The median tobacco consumption was 12 stems / day (27 PY), for a maximum of 40 stems / day (144 PY). This consumption of smokers in Kinshasa is higher than that of Canadian smokers (13), but comparable to that of French and Belgian smokers (3,29,34).

Smoking more tobacco stems is not without consequences on health, the Congolese publications (24,35), American and European confirm (5,22). The authors describe the intensity of cumulative smoking as a risk factor for respiratory and cardiovascular diseases (8,15,24,34). Comparing the amount of smoked tobacco reported by these authors and that of our series, we observe that in the present study, the quantity consumed is greater than that observed in these publications; however, only 2.5% of the

smokers interviewed in our series reported having had a respiratory illness since they smoked. This can be explained by the fact that smoking-related respiratory illnesses generally occur after several decades of exposure to tobacco (23) and the median exposure to tobacco observed here is only 8 (QI : 1- 17 years. In addition, African cultural considerations would be another element of explanation. Indeed, the evocation of a disease is a taboo subject for an African; see a weakness that smokers certainly did not want to reveal. Also, medical screening at the asymptomatic stage, is not culture among Congolese (2,25). As a result, the reality of respiratory problems in the smokers studied is probably difficult to estimate.

The high prevalence (84.2%) of observed alcohol consumption is strongly related to tobacco consumption ($r = 0.4$, $p < 0.001$). The seniority of alcohol and tobacco consumption are also similar in the two groups, respectively 8 (QI: 0-16) years and 8 (QI: 1-17) years, with a strong correlation ($r = 0.6$, $p < 0.001$). Moreover, significant links were found between the amount of smoked tobacco (PY) with the alcohol bottles consumed, and with the number of years of alcoholism (respectively $r = 0.5$ and $r = 0.5$; $p < 0.001$). Several authors corroborate our observations (3,16,22,38). Molimard describes that there is a strong link between tobacco and alcohol and that cigarette consumption increases with the amount of alcoholic beverages. He further argues that it is rather alcohol dependence that leads to heavy tobacco consumption (38). The reverse has been observed among Canadian teen smokers where the majority of alcohol insiders (71%) have never tried smoking cigarettes, whereas among tobacco initiates, the majority (63%) has already consumed alcohol in their lives (39). There is also a biochemical and physiological dependence between these two products. Indeed, the biochemical actions of alcohol and tobacco all pass through the same neuroendocrine pathways. The consumption of alcohol activates the need for nicotine. It acts by attenuating the psychotropic effects of alcohol by activating dopaminergic, serotonergic, gabaergic and glutamate receptor inhibition systems (38). Thus drunkenness and euphoria seem to be reduced in the smoking drinker, motivating a consumption behavior that combines the two addictive.

Although smokers studied had a median BMI in the normal range and less than 1/6th or in leanness. Nearly half (48.3%) of them reported that they had lost weight since smoking ; corroborating the literature that reports a decrease in BMI decrease of 3 to 5 kg of weight in regular smokers (12). Nevertheless, without establishing a numerical assessment of the weight loss associated with alcohol or tobacco consumption, we found that smoking-alcohol consumption is a factor that negatively influences BMI significantly ($r^2 = 0.049$, $p < 0.001$). This is theoretically explained by the fact that nicotine acting on the same receptors as ethanol influences BMI by decreasing appetite, increasing energy expenditure and slowing down fat storage (11,38). The meta-analyzes of Nanhou and Piirtola confirm, as in our series, that long-term smoking decreases BMI (14,39).

In terms of haemodynamics, Kinshasa smokers have a median DBP of hypertensives, and 59% of them have a value greater than or equal to 90 mmHg. The increase in this DBP is positively influenced by age, the amount of tobacco stem and bottles of alcohol consumed ($p < 0.001$), and the age of smoking ($p = 0.008$). This contrasts with the negative relationship between this DBP and seniority in alcoholism ($p < 0.001$). Linneberg does not associate smoking with the elevation of DBP (15). But several other authors corroborate our series, associating smoking with increased blood pressure in a way general ; in fact, the work carried out in the DRC and elsewhere report that the amount of tobacco smoke regularly (pack-years) and the tobacco seniority are factors influenced ant hypertension (6,8,13,26). In addition, there are recognized relationships between heavy alcohol consumption and increased blood pressure regardless of race (40). Thus, a positive relationship between seniority for alcoholism and cumulative blood pressure has been reported (38,40), which does not support our series. The neuroendocrine arguments underlie tobacco and alcohol acting on the same receptors of the autonomic nervous system. They each have specific effects on vascular tone, myocardial activity and the angiotensin-aldosterone system (38,40). They work by increasing blood pressure through SBP and DBP. Although the receptors seem to have more affinity with nicotine; but in the situations of combined consumption of the two drugs, one would attribute the effects on the arterial pressure to the synergistic action of the compounds of two additives (38); alcohol having the most action on the aldosterone-angiotensin system (40).

In the absence of comparison with a control, dyspnea, clinical and spirometric indicator group in these smokers, only the resting respiratory rate allowed to get an idea about the respiratory function of the studied sample. . The resting respiratory rate was high in more than 80% of smokers. We observed that it increased with the age of smoking ($p < 0.001$), the age of alcohol consumption ($p < 0.001$) and the amount of smoked tobacco ($p < 0.001$). The majority of studies conducted on smokers report that smoking and alcoholism influence respiratory symptoms and worsen respiratory disease clinics, but do not specify their influence on the resting respiratory rate (41,42). It is also known that smoking is a risk factor for respiratory diseases (5,24,28). Therefore we can understand that the resting respiratory rate which is an indicator of respiratory disease is high in our series ; and that it is influenced by the associated behavior smoking-alcoholism, both addictive having a cumulative effect on the stimulation of the autonomic nervous system, regulator of the respiratory rate (38).

Conclusion

This study on regular active smokers in Kinshasa showed that it is men, young people under 40 and the unemployed who smoke the most. These smokers have a sedentary behavior and more than 4/5ths of them consume alcohol regularly. This consumption of alcohol is strongly correlated with smoking. The quantity and duration of consumption of these two addictive substances are factors influencing their anthropometric and cardiorespiratory

parameters. Regular awareness of this group on the combined consumption dangers of these two drugs is necessary.

Limitations on the methodology: low sample size to generalize, the subjective nature of the general characteristics, clinical and history of smokers studied will certainly be a significant factor in the interpretation of this study and its generalization.

Nevertheless, the study provides global information on Kinshasa smokers, the influence of addictive smoking-alcohol consumption behavior, while allowing to project future studies taking into account the limitations of the present.

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Author's Contributions:

LVPG: field surveys, collection and analysis of data, preparation of the manuscript, **DG:** statistical analysis, manuscript revision and literature search. **KMA:** reading and revision of the manuscript. **KKL:** collection data and preparation of the manuscript. **LBF:** development of the manuscript. **MNR:** Reading and correction of the manuscript. **NBH:** reading, manuscript correction and literature search.

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