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Biological Profile and Cardiovascular Risk in Patients Receiving Neuroleptics at the Psychiatric Department of the University Hospital Center of Brazzaville

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Abstract

Several studies report the problem of cardiovascular tolerance of treatments with neuroleptics, given the important number of morbidities in patients with mental illnesses. This preliminary work aimed to describe the epidemiological and biological profile of patients taking neuroleptics and followed in the psychiatry department of Brazzaville University Hospital, from the angle of cardiovascular risk. Fifty (50) patients (17 men and 33 women), with a mean age of 33.9 ± 10.7 years, were included. Epidemiological data (sex, age, tobacco or alcohol consumption) were collected on pre-established survey forms. Biochemical (total cholesterol, HDL-c, triglycerides and atherogenicity index) and inflammatory parameters (ultra-sensitive CRP, troponin I and NT-ProBNP) were investigated using enzymatic and indirect immunofluorescence technical, respectively. The results obtained showed that 54% of patients were obese, 94% were non-smokers, and 12% had high blood pressure. 10% of patients had high total cholesterol levels and 90% had HDL cholesterol levels below 60 mg/dl. Triglycerides and atherogenicity index were significantly elevated in relation to Body Mass Index (BMI). Ultrasensitive CRP was elevated in 38% of patients. In conclusion, this study revealed an association between lipid parameters (triglycerides and atherogenicity index) in relation to BMI in patients taking neuro-

leptics followed in the Psychiatry Department of University Hospital Center of Brazzaville.

Keywords

Neuroleptic, Cardiovascular Risk, Psychiatry, Brazzaville

1. Introduction

The first neuroleptics appeared in the middle of the 20th century with chlorpromazine developed by a French laboratory in 1950. They are used mainly in psychiatry in the treatment of schizophrenia, dementia and even bipolar disorders [1]. Their introduction into the therapeutic arsenal of psychoses has revolutionized the management of psychotic disorders. However, adverse effects, mainly neurological, have limited compliance with these treatments, although second-generation antipsychotics, which have recently appeared, offer better tolerance [2].

Several authors report that cardiovascular mortality in schizophrenia patients is high compared to the general population [3] [4]. Several cardiovascular risk factors are associated with this excess mortality, such as smoking, alcohol consumption, poor dietary hygiene and a sedentary lifestyle [5]. However, in recent years, the question of cardiovascular tolerance to neuroleptic treatments has been debated, given the significant number of sudden deaths among patients under antipsychotic treatment [6].

Very little data is available on the specific contribution of these different factors, whether pharmacological or linked to the psychiatric illness itself, to the development of cardiovascular risk [7]. Some existing data comes from previous studies on patients treated with neuroleptics in Western countries [8]. The most important biological factors linked to pharmacological treatment seem to be related to the action of drugs on numerous receptors, in particular the serotonergic 5HT2c and histaminergic H1 receptors [9].

There appears to be a correlation between total cholesterol and LDL levels and response to treatment with antipsychotic medications [10]. In a review of the literature, it's reported that that some conventional antipsychotics (such as haloperidol) and atypical antipsychotics (ziprasidone, risperidone and aripiprazole), appear to be associated with lower-risk hyperlipidemia [8]. On the other hand, other conventional antipsychotics (chlorpromazine and thioridazine) and atypical antipsychotics (quetiapine, olanzapine and clozapine) were associated with a risk of hyperlipidemia [8] [9].

To our knowledge, no study has been conducted on the assessment of cardiovascular risk in patients taking neuroleptics in the Republic of Congo. In this study, we tried to describe the epidemiological and biological profile of patients taking neuroleptics followed in the psychiatry department of the University

Hospital Center of Brazzaville, from the angle of cardiovascular risks.

2. Patients and Methods

2.1. Study Population and Data Collection

This is a descriptive cross-sectional study carried out between June and November 2023. The study population was composed of patients aged 18 or over, stable, taking neuroleptic treatment, without cardiovascular disease and followed in the psychiatry department at the Brazzaville University Hospital Center. Epidemiological data (sex, age, tobacco or alcohol consumption, therapeutic modalities) were collected on pre-established survey forms. They were completed, if necessary, from patient records. The clinical examination was carried out by a psychiatrist. Informed consent was obtained from each legal representative of the patient and the study benefited from ethical clearance from the Ethics Committee for Research in Health Sciences (CERSSA, n˚043-40/MESRSIT/DGRST/CERSSA/-23).

Fifty (50) patients (17 men and 33 women) were included. The mean age was 33.9 ± 10.7 years. Body Mass Index (BMI) was calculated according to the following formula:

$$\text{BMI} = \text{weight (Kg)}/\text{height}^2\ (\text{m}^2).$$

Overweight and obesity were defined for BMI values greater than or equal to 25 and greater than or equal to 30 kg/m^2, respectively [11].

2.2. Biological Analysis

For each patient, 5 mL of blood was collected in a tube with coagulation accelerator and transported to the laboratory where they were centrifuged and the serum placed in 1 mL aliquots and then stored at −20˚C until biological analyses. Concentrations of total cholesterol (TC), HDL-c and triglycerides were determined by colorimetric enzymatic methods using a *Biomate 3S* spectrophotometer using *CYPRESS* commercial kits. Ultra-sensitive CRP, troponin I and NT-ProBNP were searched for by indirect immunofluorescence techniques, using the Getein 1600 biotech, Inc. automated system.

2.3. Statistical Analysis

The data were entered into Excel 2016 and statistical comparisons using GraphPad Prism® version 8.0 software. Qualitative variables were expressed as mean ± 1 standard deviation and quantitative variables as frequency and percentage. The comparison of quantitative variables was made using the *Student's t test*, and by ANOVA analysis. The comparison of qualitative variables was made using the χ^2 test and that of frequencies using the odds ratio (OR) with adjustment for confounding factors using logistic regression. The significance level was set at $p < 0.05$.

3. Results

During the study period, 50 patients were included, including 17 men and 33 women. The average age was 33.9 ± 10.07, with extremes ranging from 18 to 53

years. 54% of patients were obese, 94% were non-smokers, and 12% had high blood pressure. 56% of patients included were on monotherapy. The population characteristics studied are summarized in Table 1.

The proportion of patients with higher fasting glycemia at 1.11 g/l was 22%. 10% of patients had high total cholesterol levels and 90% had HDL cholesterol levels below 60 mg/dl. The proportion of patients who had a triglyceride level greater than 150 mg/dl was 20%. Ultrasensitive CRP was elevated in 38% of patients. All patients included in this study had normal Troponin I and NT-ProBNP levels. These results are presented in Table 2.

The plasma concentrations of biological markers and atherogenicity indices according to the epidemiological characteristics of the patients are presented in Table 3. A significant increase in triglycerides and the atherogenicity index in relation to BMI was found in this study.

Table 1. Epidemiological characteristics of the study population.

Characteristics	Details
Men/Women (ratio)	17/33 (0.51)
Age (years)	33.9 ± 10.07
BMI (kg/m^2)	
<25	16 (32%)
Overweight (26 - 29.9)	07 (14%)
Obesity (≥30)	27 (54%)
Smoking status	
Smokers	3 (6%)
Non smokers	47 (94%)
Alcohol status	
Consumers	9 (18%)
Non-consumers	41 (82%)
Therapeutic modalities	
Monotherapy	28 (56%)
Dual therapy	22 (44%)
TA (PAS, PAD) mm Hg	
Normale (115 - 139, 75 - 89)	34 (68%)
Hypotension (<115, <75)	06 (12%)
Hypertension (≥140, ≥90)	10 (20%)

Table 2. Plasma concentrations of biological parameters in the study population.

	Average	Effective (%)
Glycemia		
Normal (0.60 - 1.10 g/l)	0.88 ± 0.02	20 (40%)
Hyperglycemia (≥1.11 g/l)	1.36 ± 0.09	11 (22%)
Hypoglycemia (<0.60 g/l)	0.55 ± 0.02	19 (38%)
Total cholesterol		
Normal (<200 mg/dl)	141.3 ± 5.17	45 (90%)
High (>200 mg/dl)	231.5 ± 7.30	5 (10%)
HDL-c		
Normal (≥60 mg/dl)	73.38 ± 0.00	1 (2%)
Low (<60 mg/dl)	36.16 ± 1.42	49 (98%)
Triglycerides_		
Normal (<150 mg/dl)	71.12 ± 6.08	40 (80%)
High (≥150 mg/dl)	210.0 ± 13.97	10 (20%)
Atherogenicity index		
CT/HDL-c	4.41 ± 1.89	
TG/HDL-c	2.98 ± 2.55	
CRP-hs		
Normal (<3 mg/l)	1.306 ± 0.12	31 (62%)
High (>3 mg/l)	5.647 ± 0.41	19 (38%)
Troponin I		
Normal (<0.1 ng/ml)	-	50 (100%)
NT-ProBNP		
Normal (<300 Pg/ml)	-	50 (100%)

Table 3. Plasma concentrations of biological parameters and atherogenicity indices according to the epidemiological characteristics of patients (M ± SD).

	Glycemia	CT	HDL-c	Triglycerides	CT/HDL-c	TG/HDL
Sex						
Male (n = 17)	0.82 ± 0.25	149.48 ± 43.87	36.68 ± 11.35	98.11 ± 65.96	4.45 ± 2.01	3.43 ± 3.31
Female (n = 33)	0.88 ± 0.38^{ns}	152.70 ± 42.05^{ns}	38.57 ± 10.57^{ns}	99.06 ± 67.35^{ns}	4.16 ± 1.39^{ns}	2.75 ± 2.01^{ns}

Continued

IMC (kg/m²)						
<25 (n = 16)	0.81 ± 0.26	149.37 ± 42.94	36.87 ± 11.37	96.37 ± 64.98	4.42 ± 1.97	1.54 ± 1.21
≥25 (n = 34)	0.87 ± 0.34^{ns}	150.60 ± 42.97^{ns}	37.04 ± 11.14^{ns}	**99.74 ± 68.18^{b}**	4.41 ± 1.91^{ns}	**3.69 ± 2.74^{a}**
Smoking status						
Yes (n = 3)	0.82 ± 0.28	150.82 ± 45.46	35.76 ± 11.4 3	97.18 ± 68.88	4.62 ± 2.10	3.10 ± 2.80
No (n = 47)	0.88 ± 0.34^{ns}	150.30 ± 43.36^{ns}	37.26 ± 11.15^{ns}	99.14 ± 68.67^{ns}	4.37 ± 1.91^{ns}	2.96 ± 2.58^{ns}
Alcohol status						
Yes (n = 9)	0.91 ± 0.29	150.86 ± 44.13	37.58 ± 10.22	98.68 ± 68.80	4.31 ± 1.82	2.88 ± 2.41
No (n = 41)	0.86 ± 0.34^{ns}	150.31 ± 42.58^{ns}	36.89 ± 11.07^{ns}	98.89 ± 67.75^{ns}	4.41 ± 1.89^{ns}	2.98± 2.55^{ns}
PAD (mm Hg)						
75 - 89 (n = 35)	0.86 ± 0.34	150.31 ± 42.58	36.89 ± 11.07	98.89 ± 67.75	4.41 ± 1.89	2.98 ± 2.55
<75 (n = 9)	0.91 ± 0.29^{ns}	150.86 ± 44.13^{ns}	37.58 ± 10.22^{ns}	98.68 ± 68.80^{ns}	4.31 ± 1.82^{ns}	2.87 ± 2.30^{ns}
≥90 (n = 6)	0.81 ± 0.27^{ns}	151.56 ± 43.88^{ns}	36.39 ± 11.05^{ns}	99.21 ± 66.11^{ns}	4.55 ± 2.02^{ns}	2.72 ± 2.70^{ns}
Therapeutic option						
Monotherapy (n = 28)	0.88 ± 0.34	150.30 ± 43.37	37.26 ± 11.15	99.14 ± 68.76	4.37 ± 1.92	2.97 ± 2.58
Dual therapy (n = 22)	0.83 ± 0.33^{ns}	150.30 ± 43.02^{ns}	37.00 ± 11.16^{ns}	100.58 ± 67.38^{ns}	4.40 ± 1.91^{ns}	3.04 ± 2.55^{ns}
Duration of treatment						
<5 years (n = 36)	0.84 ± 0.32	148.12 ± 42.75	36.74 ± 11.73	103.71 ± 70.69	4.41 ± 2.00	3.19 ± 2.74
≥5 years (n = 14)	0.86 ± 0.34^{ns}	150.31 ± 42.58^{ns}	36.89 ± 11.07^{ns}	98.89 ± 67.75^{ns}	4.41 ± 1.89^{ns}	2.98 ± 2.55^{ns}

(a): p = 0.006; (b): p = 0.005; (ns): not significant.

4. Discussion

The objective of this study was to determine the epidemiological and biological profile of patients taking neuroleptics and followed at the University Hospital Center of Brazzaville, from the angle of cardiovascular risk.

Fifty (50) patients were included, including 17 men (34%) and 33 women (66%). The mean age was 33.9 ± 10.07. Obesity was found in 54% of patients. Arterial hypertension was present in 12% of cases. Monotherapy constituted the therapeutic modality in 56% of patients.

In this study, 18% of patients consumed alcohol. Tobacco consumption was found in 6% of patients. These results were close to those obtained in 2023, by Bait [12] in the Ouargla psychiatry department, who reported an alcohol consumption of 14.3% and 7.2% for tobacco. These relatively low frequencies could be associated with the female predominance found in these studies.

BMI and blood pressure are risk factors for cardiovascular disease. The results obtained in this study show that obesity was found in 54% of patients. Our re-

sults are similar to those obtained by other authors who report obesity in 40 to 50% of patients taking neuroleptics [13]. It is also reported that certain antipsychotic treatments such as olanzapine, risperidone and clozapine would favor further weight gain and would also increase the risk of dyslipidemia. The risk of abdominal obesity would be three times higher in patients receiving chronic neuroleptic treatment than those without treatment [14].

Furthermore, 20% of patients presented with low blood pressure. It is accepted that an increase in BMI, associated with a reduction in blood pressure increases the risk of developing cardiovascular diseases [15].

Monotherapy was the most common therapeutic modality among patients followed in the department (56%). These results are similar to those found in Algeria by Rachida Belalta [16] who reported a frequency of 67%.

Lefebvre *et al*. [17] report that high blood levels of total cholesterol, LDL-c, triglycerides and low levels of HDL-c strongly increase the risk of coronary heart disease with an increased risk of cardiovascular disease 32% among men and 76% among women, at each increase of 1 mmol/L in triglyceridemia. The results obtained in the present study showed that 10% of patients had high triglyceride levels and 80% of patients had low HDL-c levels. Regarding glycemia, our results showed that 40% of the population had normal glycemia. These results differ from those of Kone in Mali [18] which reported a normal fasting glycemia frequency in 76.4% of patients in the psychiatry department.

It is reported in the literature that individuals with concentrations of high plasma levels of ultrasensitive CRP (>3.0 mg/L) have a higher risk of developing cardiovascular disease than individuals with normal concentrations or below 1.0 mg/L [19] [20]. The results obtained in this study show that 38% of patients had a high hs-CRP level (>3 mg/L). These results are in agreement with those reported by Fernandes *et al.* [21] who found elevated CRP levels in people with schizophrenia regardless of the antipsychotic used. Wysokiński *et al.* [22] in the Czech Republic found an increase in CRP of 35.7%.

In our study, all patients had normal troponin I and Pro BNP levels. These results demonstrate the absence of damage to the heart tissue.

We did not find a significant increase in CT and HDL-c levels, linked to BMI, contrary to Ezzaher *et al*. [23] who found an increase in CT, LDL-c and a decrease in HDL-c in obese patients. The same goes for epidemiological characteristics such as sex, smoking or alcohol status, blood pressure, therapeutic modalities and duration of treatment which seem not to affect biological variables, in our study. However, we found a significant increase in triglycerides and the atherogenicity index (CT/HDL-c and TG/HDL ratios) in relation to BMI.

The low power of our study did not allow us to extrapolate our results to the entire population suffering from schizophrenia. It nevertheless makes it possible to obtain new information that larger studies will have to complete. Indeed, this study has the advantage of addressing biological changes in patients taking neuroleptics, from the angle of cardiovascular risk. To our knowledge, there is no

study on the epidemiological, clinical and biological characteristics of patients taking neuroleptics, seen from the perspective of overall cardiovascular risk. Our study did not allow us to conclude that there is a cardiovascular risk in patients taking neuroleptics, in the absence of a comparison population. An approach based on the patient's level of cardiovascular risk based on SCORE [15] may allow earlier treatment in primary prevention.

5. Conclusion

The objective of this work was to study the cardiovascular risk biomarkers of patients taking neuroleptics followed in the psychiatry department of CHU-B. Female patients were more represented at 66%. The age range of the patients was 25 and 35 years. Analysis of the biomarkers revealed non-significant disturbances in glycemia, lipid parameters including triglycerides and HDL cholesterol as well as CRP-hs. The Troponin I and NT-ProBNP assays, on the other hand, showed no disturbance. However, obesity was associated with the risk of atherogenicity. An assessment of overall cardiovascular risk based on other, more precise criteria would make it possible to improve the management of patients taking neuroleptics.

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Contribution of the Authors

All authors contributed to the completion of the study, writing and correction of the manuscript.

Conflicts of Interest

The authors declare no conflict of interest.

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