



Literature review

Major Cardiovascular Risk Factors and Serious Mental Disorders, a Double-Edged Sword : Literature Review

Facteurs de risque cardiovasculaire majeurs et troubles mentaux graves, une épée à double tranchant : revue de la littérature

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ABSTRACT

Background. The burden of mental disorders continues to grow with significant impacts on health. Their prevalence is higher in patients presenting cardiovascular risk factors. This review takes stock of the frequency, the mechanisms, and the implications of major cardiovascular risk factors in patients with serious mental disorders. **Methods.** A literature search was done in PubMed from 1980 to 2021 using various combinations of Mesh terms like tobacco, diabetes mellitus, hypertension, dyslipidemia, major depressive disorder, bipolar disorder, schizophrenia. **Results.** People with serious mental disorders have a greater prevalence of major cardiovascular risk factors compared to the general population. Conversely, people with cardiovascular diseases more frequently suffer from serious mental disorders. More specifically, we note that 45 to 88% of patients suffering from schizophrenia are tobacco users, Depression is reported to be 3 times higher in hypertensives than in non-hypertensives while around 19% of type 2 diabetic patients suffer from major depressive disorder which is 3 times greater than in the general population, and the prevalence of dyslipidemia among persons with severe and persistent mental illness is higher than the prevalence in the general population and ranges from 25% to 70%. The concomitant presence of these different pathologies can be explained either by their intertwined pathophysiological mechanisms, or by the side effects of the various medications taken in the context of these chronic diseases. **Conclusion.** The predisposing factors for the coexistence of mental illnesses and cardiovascular diseases are often entangled. It would be interesting to carry out more studies to elucidate precisely the different pathophysiological mechanisms of these diseases.

RÉSUMÉ

Contexte. La prévalence des maladies mentales est plus élevée chez les patients présentant des facteurs de risque cardiovasculaire. Cette revue fait le point sur la fréquence, les mécanismes et les implications des facteurs de risque cardiovasculaire majeurs chez les patients atteints de pathologies psychiatriques graves. **Méthodologie.** Une recherche documentaire a été effectuée dans PubMed de 1980 à 2021 en utilisant diverses combinaisons de termes MeSH comme tabac, diabète, hypertension, dyslipidémie, trouble dépressif majeur, trouble bipolaire, schizophrénie. **Résultats.** Les personnes atteintes de maladies mentales graves ont une plus grande prévalence de facteurs de risque cardiovasculaire majeurs comparé à la population générale. À l'inverse, les personnes atteintes de maladies cardiovasculaires souffrent plus fréquemment de troubles mentaux graves. Plus précisément, on note que 45 à 88% des patients souffrant de schizophrénie consomment du tabac. La dépression serait 3 fois plus élevée chez les hypertendus que chez les non hypertendus. Par ailleurs, environ 19% des patients diabétiques de type 2 souffrent d'un trouble dépressif majeur ce qui est 3 fois plus élevée que dans la population générale. La prévalence des dyslipidémies chez les personnes atteintes d'une maladie mentale grave est supérieure à la prévalence dans la population générale et varie de 25% à 70%. La présence concomitante de ces différentes pathologies s'explique soit par leurs mécanismes physiopathologiques imbriqués, soit par les effets secondaires des différents médicaments pris dans le cadre de ces maladies chroniques. **Conclusion.** Les facteurs prédisposant à la coexistence des maladies mentales et des maladies cardiovasculaires sont souvent intriqués. Il serait intéressant de mener plus d'études pour élucider précisément les différents mécanismes physiopathologiques de ces maladies.

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INTRODUCTION

Mental illnesses are very common pathologies throughout the world. It is estimated that 970 million

people worldwide had a mental illness in 2017[1]. Patients with these pathologies have a poor quality of life and a

HIGHLIGHTS**What is already known on this topic**

The prevalence of mental disorders is higher in patients with cardiovascular risk factors.

What question this study addressed

The frequency, the mechanisms, and the implications of major cardiovascular risk factors in patients with mental disorders.

What this study adds to our knowledge

People with serious mental disorders have a greater prevalence of major cardiovascular risk factors compared to the general population.

How this is relevant to practice, policy or further research.

It's still necessary to elucidate precisely the different pathophysiological mechanisms of these pathologies

reduced life expectancy as compared to the general population and are associated with an annual mortality rate of 2.2% [2].

This high mortality is not only due to their Mental illness but also to the various comorbidities seen in these patients [2,3]. Among these comorbidities, cardiovascular risk factors (CVRF) occupy a preponderant place [2,3].

Cardiovascular diseases are the leading cause of death in the world. They occur most often in people presenting cardiovascular risk factors [4]. Patients with serious mental disorders have a greater predisposition to cardiovascular diseases. The presence of one or more cardiovascular risk factors in mentally ill patients worsens their prognosis [2,3]. Cardiovascular diseases (CVD) can either precede the onset of mental illness, appear concomitantly with it, or develop on an already psychiatric ground [5]. The presence of CVDs is usually related to the patient's medical history and/or lifestyle, but may also be due to the different medications the patient is taking [1–3].

The aim of this review is to emphasize on the existing relationship between psychiatric disorders and major cardiovascular risk factors, a relationship that needs to be taken into consideration in the care of patients with serious mental disorders to better their outcomes.

METHODS

This review focused on the current evidence on the association between the main cardiovascular risk factors and serious mental disorders. A literature search was conducted in the PubMed database on the association between serious mental disorders and major cardiovascular risk factors in articles published between January 1980 and April 2021. MeSH terms and free text terms for CVRF like tobacco, diabetes mellitus, hypertension, dyslipidemia, and for serious mental disorders (major depressive disorder, bipolar disorder, schizophrenia) were used. Further literature search was done from the reference lists of identified articles. In this paper, the terms mental illness, psychiatric disorder, affective disorders are used alternately to mean the same thing.

RESULTS**Tobacco**

Every year, tobacco kills more than 8 million people worldwide [6]. Close to 90% of these deaths are due to

direct tobacco use while the rest result from non-smokers being exposed to second-hand smoke [6]. Higher rates of tobacco dependency have been reported among individuals with mental disorders than in the general population [7,8]. A meta-analysis found that the prevalence of smoking in schizophrenia (SZ) was 62%, which is 5.3 times higher than in the general population [7–9]. Another study suggests that the rate of tobacco smoking was between 45 and 88% in SZ compared to <16% of the general population [10]. In Western studies, the prevalence of smoking in other psychiatric disorders seems to be lower than in schizophrenia: 31.2–66% in bipolar disorder and 34–60% in depression. But these rates are still much higher than in the general population [9,11]. In people with bipolar disorder, smoking is associated with negative physical and mental health outcomes compared with non-smoking [11]. In sub-Saharan Africa, very few studies have been carried out on the subject, however, a study carried out in Uganda (East Africa) suggests that 16% of people with serious mental disorders (schizophrenia, depression, bipolar disorder) are smokers unlike 10% in the general population [12,13].

This high prevalence of smoking in people with mental illnesses can be explained by many factors: first, there may be some intrinsic factors such as genetic factors which predispose people with mental illnesses to smoke [10,14]. Secondly, nicotine may be used by mentally ill patients to self-medicate psychiatric symptoms. Nicotine is thought to modulate neurotransmitters involved in the development of mental illnesses such as dopamine. It also promotes the release of other neurotransmitters including acetylcholine, endogenous opioid peptides, GABA, norepinephrine, and serotonin, which are also involved in the pathogenesis of mental disorders [10]. Thirdly, tobacco and mental illness share several common social and environmental determinants such as poverty and stress [10]. Tobacco use in people with mental illness sometimes precedes the diagnosis of mental illness, and in some cases begins after the diagnosis of mental illness [6,7,12], compounding the development of CVDs.

Hypertension

The WHO estimates that more than 1.13 billion people are affected with hypertension worldwide [15]. In sub-Saharan Africa, about 80 million patients suffered from hypertension in 2000. These figures are expected to increase to 150 million by 2025 [16]. Hypertensive patients experience many profound emotions which increase their risk to developmental health disorders; particularly anxiety and depression [13,17]. In Africa, it is estimated that 18.6%, 37.3% and 7.9% of patients have depressive disorders, depressive symptoms and Major depressive symptoms respectively [17]. Depression is reported to be 3 times higher in hypertensives than in non-hypertensives with or without other comorbidities [18]. Likewise, 56% of Hypertensive patients experience anxiety, while 20% experience stress [19].

Conversely, mental illnesses and even symptoms of serious mental disorders can predispose to the development of hypertension. It is the case of hopelessness that was associated with an increased incidence of hypertension in

616 initially normotensive men, in a 4-year follow-up prospective study in Finland[18,20]. Men reporting high levels of hopelessness at baseline were 3 times more likely to become hypertensive than men who were not hopeless[20,21]. An increased prevalence of hypertension in depressed patients has also been described by Adamis and al. They studied the comorbidity between psychiatric and physical diseases in 75 elderly psychiatric inpatients, and found that depressed patients had more cardiovascular diseases and hypertension than other psychiatric patients[22]. Depression increases the risk of hypertension by close to 57% within 10 years[23].

The occurrence of hypertension in mental illness is due to a combination of factors. It may be linked, on one hand, to the mental illness itself, through altered sleep patterns, sympathoadrenal hyper-reactivity, various neurotransmitter abnormalities, and altered inflammatory processes capable of inducing hypertension[24]. On the other hand, the occurrence of hypertension may be linked to the medications taken by the patient in connection with his mental illness such as monoamine oxidase inhibitors, tricyclic antidepressants and fluoxetine [13,19,24]. The increased levels of serotonin and dopamine play an important role in how these drugs raise blood pressure, but the precise mechanisms are still a matter of some debate[25]. The most accepted hypothesis is that these medications increase overall activity in the nervous system, which might amplify certain signals (such as those controlling blood pressure) that the nervous system sends to the rest of the body[25].

Diabetes

The number of people with diabetes rose from 108 million in 1980 to 422 million in 2014[26]. In 2019, an estimated 1.5 million deaths were directly caused by diabetes[26]. Diabetes mellitus (DM) is a recognized risk factor for the development of many mental illnesses. It is reported that the prevalence of depression is more than three times higher in people with type 1 diabetes (12%, vs. 3.2%) and nearly twice as high in people with type 2 diabetes (19.1%, vs. 10.7%,) compared to those without[27]. Similarly, another study suggests that depression in the diabetic is two times more important than in nondiabetic patients (OR = 2.0, 95% CI 1.8–2.2). However, sex, type of diabetes, and the methods of assessment do not seem to impose significant difference on the occurrence of depression [28].

A systematic review of the literature shows that age- and gender-adjusted risk for diabetes mellitus increases in patients with bipolar disorder and vice versa (odds ratio range between 1.7 and 3.2)[29]. Another study, done by Kruse et al suggests that the presence of diabetes increased the odds of affective disorders in general (OR: 1.73, P: 0.047) and anxiety disorders in particular (OR: 1.93, P: 0.008)[30].

Conversely, serious mental disorders are accompanied by a higher incidence of diabetes. This is the case with schizophrenia where the prevalence of type 2 diabetes is 2-3-fold higher than in the general population and estimates of prevalence range from 10 to 15%, [31]

The development of diabetes mellitus in patients with mental illness could be due to medications. Antipsychotic

medications like olanzapine and clozapine correlate with higher rates of DM [32]. The association of DM and mental illnesses may also be the result of common epigenetic pathways[27,29,32].

Dyslipidemia

One of the most widespread risk factors for cardiovascular disease is dyslipidemia, defined as elevated total cholesterol (TC), elevated low-density lipoprotein cholesterol (LDLc), or low high-density lipoprotein cholesterol (HDLc). Dyslipidemia occurs in about 25% of adults[33]. There is a linear relationship between plasma levels of LDLc, TC, and HDLc (inverse relationship) and the development of cardiovascular disease and mortality [34,35]

In a literature review by Vanderlip and al. in 2012 the prevalence of dyslipidemia among persons with serious mental disorders ranged from 25% to 70%, higher than in the general population[35]. The prevalence of dyslipidemia in schizophrenia ranges from 25-69% and from 25-38% in bipolar disorder[36]. These rates are higher than those seen in age-matched persons without severe and persistent mental illness[35,36].

The high prevalence of dyslipidemia in mentally ill patients could also be caused by their medication: Antipsychotic medications are associated with metabolic side effects that include various degrees of weight gain and dyslipidemia. Thus, the prevalence of metabolic syndrome in patients diagnosed with schizophrenia who take an antipsychotic medication is approximately 40%. Lithium and valproic acid, which are used as Mood Stabilizers can also cause weight gain, and thus increase the risk of metabolic syndrome[37]. Elevated blood lipids, particularly triglycerides, are associated with some typical antipsychotic agents like phenothiazines. Atypical antipsychotics like clozapine and olanzapine may cause significant hypertriglyceridemia[36].

CONCLUSION

Patients with serious mental disorders have more major cardiovascular risk factors than the general population. This is linked to the pathophysiological mechanism of mental illnesses and the common risk factors they share with CVRF, and may also be related to various medications. Conversely, patients with certain major cardiovascular risk factors develop serious mental disorders more frequently. This seems to be linked mainly to the socio-economic burden and the various complications caused by these cardiovascular risk factors. It is necessary to always look for the various cardiovascular risk factors in patients followed for mental illness and vice versa for early detection of these different ailments that deteriorate the prognosis of the mentally ill patients.

Authors Contribution

Conception and design: KYH, NSN

Manuscript drafting: KYH, NSN; ANG

Manuscript revision: KYH, NSN, ANG, TAT, EBD, EFT

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Conflict of Interest

The authors declare no conflict of interest.

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