Original Article

"Gateway Drug Theory:" The Experience/Contribution Coming from the Service for Pathological Dependencies of Parma (Italy)

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Abstract

Background: "Gateway Drugs Theory" indicates the assumption that the use of an illicit drug or psychoactive substance may be associated with a greater likelihood of switching to using more harmful substances. **Materials and Methods:** With reference to this theory, the objective of this study is to understand how many of the subjects that referred to the Service for Pathological Dependencies (SerDP) of Parma, from 2016 to 2019, and who kicked off their addiction to cannabis, have then switched to the use of different drugs, by analysing all the information obtained from the patients and their health life archive. **Results**: The total number of patients considered was 160 (142 males and 18 females). 35 out of 160 subjects (21.9%) manifested the switch, i.e. a substance "escalation" that induced the subject to being using cannabis as another drug. 60% of the patients (21/ 35), after an average of 2 years of cannabis use, started abusing cocaine too. Among them, moreover, few particular cases arose, namely 4, in which simultaneous positivity also resulted for other substances. It turns out that 17 patients (48.6%) out of 35 experienced the switch towards cocaine, while 4 patients (11.4%) manifested a switch to more than one substance. Considering the passage to opiates, 9 patients were identified (25.7%). 5 patients all switched to amphetamine (14.3%). **Conclusions**: The theory of cannabis as a gateway drug should be associated with the theory of vulnerability according to which some people, due to genetic, individual and environmental characteristics, are more exposed at the risk of developing addiction if placed in contact with drugs.

Keywords: Cannabis, dependence, forensic toxicology, gateway drug theory, illicit drugs

Introduction

The most common illicit drugs of abuse around the world are *cannabis*, cocaine, and opioids.[1-5] *Cannabis* use increased during the 1990s and the early part of the first decade of the 21st century in most European countries. Repeated *cannabis* use has been associated with short- and long-term side effects, including respiratory and cardiovascular disorders,[6] cognitive alterations, psychosis,[7] schizophrenia, and mood disorders.[8-10] According to the United Nations Office on Drugs and Crime, ~4% of the global adult population has used *cannabis* in their life.[11]

"Gateway Drugs Theory"– also denominated "Passage Theory," "Escalation Hypothesis," or "Progression Hypothesis" – refers to the assumption that the use of an illicit drug or psychoactive substance may be associated with a greater likelihood of switching to using more harmful substances.[12]

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This hypothesis on substance abuse behavior – confirmed in several studies in the literature – is based on the idea that the sustained use of a particular substance will cause the individual to develop a greater inclination toward risk of abuse, thus confirming the "gateway effect" of the starter drug.[13-17] The first formulations of this theory date back to the 1930s when it was referred to with definitions such as: "Milestone theory," "Bridge Drug Hypothesis" or "Progression Hypothesis."[18] According to the gateway hypothesis, individuals rarely use

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certain substances, such as heroin or cocaine, without having first used "gateway" substances, such as tobacco, alcohol, and *cannabis*.

Regarding the latter substance, in recent years, there has been a growing interest in the effects of *cannabis* on mental health and psychosocial functioning, including the extent to which *cannabis* acts as a "gateway drug."[19,20] Thus, several studies have focused on the percentage of people addicted to *cannabis* that started using other, more toxic, substances. The main purpose was to determine whether *cannabis,* taken at a young age, can play an important role in acting as a "bridge" toward experimentation, use, and addiction to drugs such as heroin and cocaine. The results have been mixed. On the one hand, it is known that not all those who abuse cannabis will be predisposed to an escalation of consumption and, therefore, toward the experimentation of other substances. On the other hand, it is equally known that some people addicted to illicit drugs have started their drug addiction history with the use of *cannabis*.

The objective of this study is to analyse cannabis as a gateway drug among subjects followed by the Service for Pathological Dependencies (SerDP) of Parma.

Materials And Methods

A collaboration with the SerDP of Parma was set up in October 2019. All patients who turned to the SerDP from 2016 to 2019 were considered, to carry out a retrospective study. Inclusion criteria of the study were: greater patient age (>18yo), *cannabis* as the first substance taken and the presence of at least 2 toxicological tests (urine, oral fluid, or hair) by the end of December 2019. Exclusion criteria were mixed substance intake since first access to SerDP, first substance taken other than *cannabis*, lack of toxicological tests in their health file archive. Once the eligible patients were selected, their data, obtained from interviews and medical records, were collected in an electronic database using unique identification codes to maintain the anonymity of the patients. In addition to toxicological examinations, a range of further information was collected and analyzed, such as gender, nationality, age of first intake, educational qualification, and occupation.

Approval by the Ethical Committee of the University Hospital of Parma was obtained on October 8, 2019. Approval number 809/2019/0SS/AUSLPR.

The written informed consent has been obtained from the involved subjects.

Results

As a result of the inclusion criteria, 160 patients were enrolled (142 males; 88.7% and 18 females; 11.3%).

Switching substances – Gateway substances

21.9% (35 patients) manifested the *switch*, i.e., a "substance escalation" that induced the subject to start using *cannabis* to another drug.

In particular, 60.0% of the patients (21 of 35), after an average of 2 years of *cannabis* use, started abusing cocaine too. Among them, 17 patients (48.6%, 14 males and 3 females) out of 35 had a switch towards cocaine only while 4 subjects tested positive not only to cannabis and cocaine, but also to other substances, thus confirming the possibility of poly addiction development resulting from the "gateway effect." Focusing on these 4 cases, the first patient presented positivity to alcohol and amphetamine. No other patient switched to alcohol. The second patient tested positive for methadone which was listed as a drug of abuse because it was not a therapeutic prescription. The third patient was positive to opioids (heroin). The fourth patient tested positive to drugs of psychiatric use (benzodiazepines and sertraline).

Nine patients switched from cannabis to opioids (25.7%).

Five patients (14.3%) switched to amphetamines (3 women and 2 men).

Gender and latency time

The switch occurred in 28 males out of 142 (19.7%) and in 7 out of 18 females (38.8%), with an average age of 28, while the average age of the first intake of *cannabis* was 16 *yo*. Women manifested this escalation after about 1 year of pathological dependence, whereas men did after about 3 years. Twelve subjects developed the switch to another substance within the first year they started using *cannabis*.

Citizenship and education

91.4% of patients were Italian (32/35). Regarding the level of education, all of them continued their studies after attending elementary school. 55.4% obtained the middle school license. 41.6% achieved a high school diploma, and only 3.0% of the subjects held a bachelor's degree. Among the 125 subjects that did not switch to another substance, 57.9% obtained a middle school license, 34.1% a high school license and only 8.0% just an elementary school license; none had a bachelor's degree.

Employment

The sample consists of three main categories: students, precarious or unemployed workers, and stable workers. Regarding the subjects who manifested the switch (n = 35), the majority were unemployed individuals (46.7%), followed by students (29.5%), and employed people (23.8%). Among the subjects who did not manifest the switch (n = 125), 42.7% were students, followed by unemployed (32.5%) and employed (24,8%) individuals.

Discussion

Cannabis consumption involves several concerns: the increasing rates of daily use;[21] the younger and younger age of initiation of regular *cannabis* use; its impact on cognitive functioning; possible effects on the development and progression of severe psychiatric disorders (i.e., psychosis and schizophrenia) and finally its use as "Gateway drug."[22]

In order to understand whether *cannabis* taken at a young age can play an important role in acting as a "bridge" to

experimentation and then use of other substances to the point of drug dependence, several studies have been conducted.[13,23-27] The different evolution of *cannabis* addiction may lead to different outcomes: it can remain as such and preserve itself as the only consumption, or it can progress toward seeking other substances with higher psychoactive efficacy. Although most of the studies have shown a high degree of association between *cannabis* use and use of other illicit drugs,[23,28-31] the predictors of progression from *cannabis* to other illicit drugs remain largely unknown.[16,32] In fact, the latter event-termed the "gateway effect," – depends, on the one hand, on an individual vulnerability – endogenous factors (i.e., gender, psychiatric disorders), and, on the other hand, on the context in which the subject lives – exogenous factors.

Our study, although limited to one province and to a small sample size, highlights the switch between substances in a nonnegligible percentage of cases (21.9%).

In agreement with the literature, our data confirm that the male population is much more likely to abuse *cannabis*. Worldwide, the use of drugs such as *cannabis*, cocaine, amphetamines, and opiates is prevalent among males than females.[33-35] These data certainly makes it easier to analyze and to study both the general phenomenon of drugs of abuse and the gateway theory in the male sex compared to the female one.

The average age of our population turned out to be 28 years, highlighting, however, that in most cases the first approach to *cannabis* had originated earlier. This is confirmed by several studies,[19,23,24,29] which show that the main users of *Cannabis* are young adults in the age range between 15 and 35 years old.

The risk of switching increases over the years, as shown by the NESARC study,[36] which calculates a probability of 8.7% of making a switch after only 1 year of *cannabis* addiction, in opposition to a probability of starting as early as the second year of 20%, confirming a dizzying growth after the first few years of use of the substance. Our data are in agreement, showing an increase in switch cases over time. However, they show an important gender-related difference with females being more likely to switch earlier than males (1 vs. 3 years).

Among the substances most commonly used by cannabis consumers, there are cocaine and amphetamines.[37-40] Considering this study, the percentage of the individuals who have become addicted to amphetamines and cocaine was not negligible.

Identification of the predictors is a crucial step in understanding the etiology of substance use disorders that could help in the development of more effective treatment and preventive interventions.[33,41-44] Previous research has identified endogenous (i.e., male gender, genetic predisposition, and depressive disorder), and exogenous factors (higher frequency of *cannabis* use and early onset of *cannabis* use, stress, unemployment, and easy illicit substances availability) involved in the "Gateway phenomenon;" to try to fully understand the most influential variables of the "Gateway effect," it is necessary to consider the individual predisposition and the social environment.

This study highlighted the role of an important exogenous factor: lack of employment. As a matter of fact, most of the population who manifested the switch (46.7%) consisted of unemployed individuals, followed by students. While workers are a category burdened with a lower risk of switching and *cannabis* use. In addition to this, the contribution to the switch of an important endogenous factor has emerged: the gender. In fact, proportionally, the female sample showed a higher incidence and precocity in the switch.

Conclusions

Considering what emerges from Degenhardt's research,[40] according to which it is not so much the substance but the prevalence of the use of a substance in a country that explains the gateway theory, it is worth mentioning that *cannabis* in Italy represents one of the most used substances, both in the student and general population[41,43,44] representing the third primary substance of abuse (11.2%) behind opioids (63.0%), and cocaine (24.5%).[45]

To make prevention strategies more effective, the authors believe that individuals at a higher risk of Gateway effect should be identified among *cannabis* users. This aim would currently require further and more in-depth studies to fully understand this phenomenon and the main risk factors associated with it.

From what emerged from our small sample, occupational status and gender are significant elements to be taken into account. Indeed, among young adults, unemployed individuals and students, regardless of their educational level, could represent an at-risk population on which acting with social and occupational measures could be most desirable. Another category of subjects to be targeted could be female cannabis users due to a greater and more rapid switch to harder drugs than male subjects.

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Conflicts of interest

There are no conflicts of interest.

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