



Comparison of the Cost of Treating Synthetic Cannabinoids and other Illicit Substances to the Healthcare System in the Emergency Department

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Objective: In this study, we aim to report the cost of drug use related presentations to the healthcare system and compare synthetic cannabinoids (SC) and other illicit drugs (OID) in terms of the financial burden they created as individual groups.

Material & methods: This is a retrospective study which was held in University of Health Sciences Umraniye Education and Research Hospital Department of Emergency Medicine between 01.09.2015 – 31.08.2016. Patient files were surveyed according to predetermined ICD codes with substance use related presentations and the expenses were analyzed for diagnostics, treatment and as the total cost for both SC and OID patient groups.

Results: Mean age of 721 patients who were included in our study was 27.20 ± 7.15 (95% CI: 26.68 – 27.74). 667 (96.9%) were male. Median total cost of emergency department (ED) attendances of the patients who used SCs was 103.41 (83.51-153.49) TL and 112.95 (90.12-160.73) TL for OID group.

Conclusion: Presentations to ED with illicit drug use and drug related complications contribute immensely to health expenses. More prospective and long term studies are necessary to determine the true financial impact of these presentations to ED. This may create awareness in both public and policy makers to implement actions against drug use.

Keywords: Synthetic cannabinoids, illicit drugs, substance abuse, healthcare expenses, cost of treatment

Introduction

Psychoactive drugs are being introduced in an increasing trend to the market in recent years. Synthetic cannabinoids (SC) make an important percentage of these drugs. (1) Acute intoxication cases secondary to drug abuse, is one of the most common problems in the emergency department (ED) which increased significantly over the last decade. Diagnostic tests to rule out other causes or identify potential life-threatening effects, symptomatic treatment and prolonged observation in this patient group effects the workload of ED significantly but also puts a financial burden to healthcare system. To the best of our knowledge, this aspect of substance abuse is understudied in current literature and there is no clear data on the effect of SC use on the healthcare

costs, especially in Turkey.

SC have been marketed as herbal incense, or “herbal smoking blends”, and sold under common names like K2, Spice and Synthetic Marijuana. In our study, we identified such as cocaine, DMT, heroin, marijuana, ecstasy, opioids and methamphetamine are OID's.

Material & Methods

This is a retrospective study which was held in University of Health Sciences Umraniye Education and Research Hospital Department of Emergency Medicine between 01.09.2015 – 31.08.2016. Our center is a 836-bed tertiary referral center with a patient volume of 590.000/year (430.000 adults) (2).

Patient records with the following ICD

codes were surveyed: F12. Cannabis related disorders; Z72.2 Drug use; Y57.8 Drug and other medication use related adverse effects –other; Y57.9 Drug and other medication use related adverse effects –unspecified. Patients with other ICD codes, who were under 18 years of age, who self-discharged against medical advice and declined treatment were excluded. As a result, 927 patient files were surveyed and a total of 459 records were included in our study. (Figure 1)

The patients or, friends or relatives of the patients disclosed the type of illicit drug they've used. No urine or blood tests were performed to confirm their statement, as it was not the routine procedure in our healthcare setting.

Patients' age, sex, their way of presentation (by Emergency Mobile Systems (EMS) or other ways), outcome and the cost of their treatment in Turkish Lira (TL) were recorded. To make our data easier to comprehend we used United States Dollars (USD) to report the costs. Exchange rate was 2.93 when the analysis were made (1 USD = 2.93 TL). (3)

Statistics Package for Social Sciences (SPSS) for Windows*23.0 (IBM Corporation, Chicago, Illinois) were used for statistical analyses. In order to define continuous variables, descriptive statistics (average, standard deviation, minimum, median, maximum) are used. The relation among the categorical variables is analyzed with Mann Whitney U, Chi-square test and/or Fisher exact test when it is required. P values less than 0,05 were considered statistically significant and confidence interval criterion is determined as %95.

Results

459 patients were included in our study. 442 (96.3%) were male. Mean age of patients were 27.28 ± 7.33 (95% CI: 26.60 –27.95). 306/459 patients (66.7%) used SC. There was no statistical difference in the age of patients in SC and OID groups [mean age 27.25 ± 7.27 (95% CI: 26.43 – 28.14 and 27.32 ± 7.48 (95% CI: 26.18 – 28.50), respectively, $p>0.05$] (Table 1).

Only 6 patients (1.3%) had chronic conditions and 19 (4.1%) reported alcohol use along with drugs. 223/327 (72.8%) patients

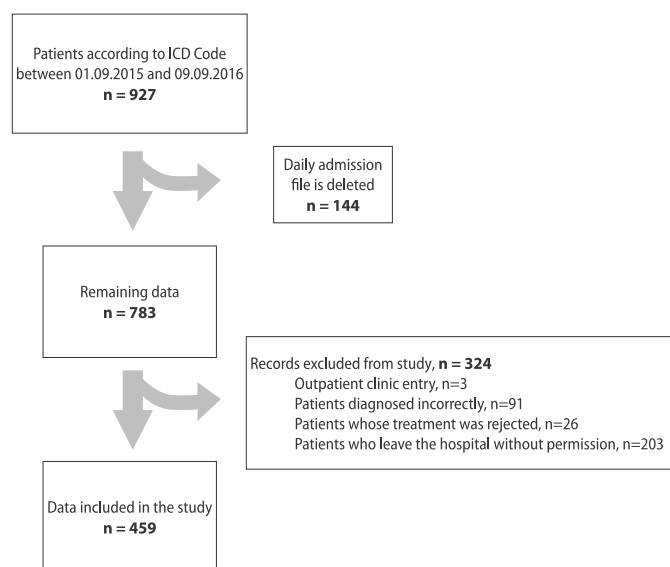


Figure 1. Schematic diagram of the study enrollment

who used SC and 104/152 (67.9%) who used OID were brought to hospital by ambulance. 5.0% (n=23) had trauma, 16 used SC among those 23 patients.

109/153 patients (71.2%) who used OID needed radiological imaging and 6 (3.9%) were consulted to other specialties while 81 (66.7%) had imaging and 12 (3.9%) were consulted in SC group.

Two patients from both groups needed endotracheal intubation to protect their airway during their course of stay in ED. 445 patients (96.94%) were discharged, and 11 patients (2.40%) needed intensive care unit admission and 3 (0.65%) were admitted under other specialties. The average cost to health care system by the patients who used OID was 40,51 (31,70-61,36) USD and the average cost of the patients who used SC was 36,04 (28,46-53,36) USD. (Figure 2)

According to our study, we found that there was a statistically significant difference between the OID group and the SC group

Table 1. Descriptive data of patients who used synthetic cannabinoids and other illicit drugs. SC=Synthetic cannabinoids, OID=Other illicit drugs, EMC= Emergency Medical Service, ICU=Intensive care unit.

	SC group	OID group	Total
Patients	n = 306 (66,7 %)	n = 153 (%33,3)	n = 459
Age	$27,25 \pm 7,27$ (95% CI: 26,43 – 28,14)	$27,32 \pm 7,48$ (95% CI: 26,18–28,50)	$27,28 \pm 7,33$ (95% CI: 26,60–27,95)
Male	n = 295	n = 147	n = 442
Female	n = 11	n = 6	n = 17
Brought by EMS	n = 223	n = 104	n = 327
Came in other ways	n = 83	n = 49	n = 132
Discharged	n = 297	n = 148	n = 445
Admitted to ward	n = 3	n = 0	n = 3
Admitted to ICU	n = 6	n = 5	n = 11

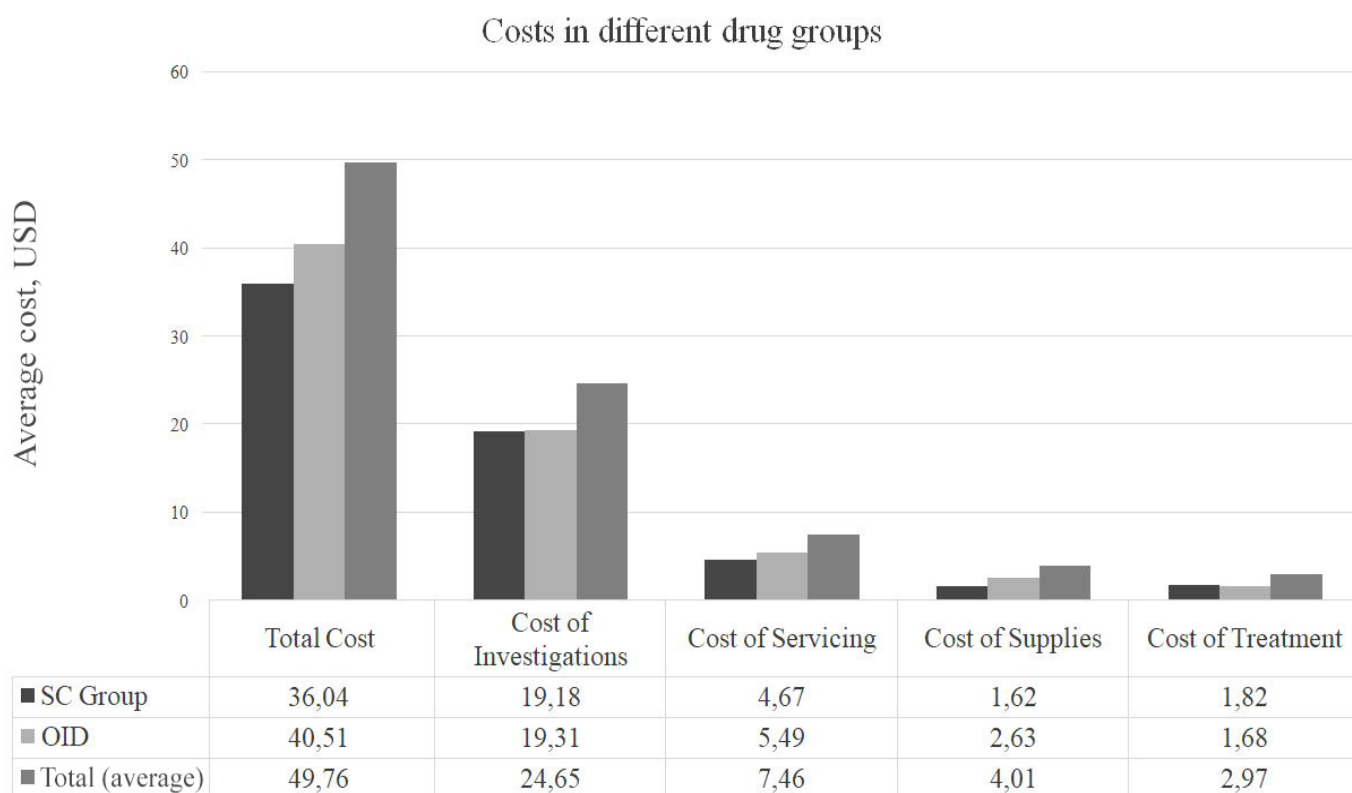


Figure 2. Costs in different drug groups. SC=Sythhetic cannabinoids, OID= Other Illicit Drugs.

in terms of total costs and costs of investigations. (Mann-Whitney U test, $p=0,02$ and $p=0,014$, respectively). No significant difference was found among the patient groups in terms of cost of servicing, of medical supplies, of treatment. (According to the alpha level of 0,005, Mann-Whitney U test, $p=0,225$, $p=0,050$, $p=0,458$).

Discussion

Costs of emergency service constitute a substantial part of the health expenses. (4) Drug related presentations increase both the workload and the health expenses of ED, causing indirect loss of workforce, and very likely contributing to staff burn-out and cause more financial burden that is nearly impossible to determine. SCs are reported to be a common cause in drug related presentations and they have a lot of adverse effects including death (5). The main reasons behind their popularity amongst drug users are their accessibility and reasonably cheaper price in the street (6). Our study confirms that SCs are responsible for the majority of the drug related presentations to ED. We believe this was caused by the low socioeconomic status of our patient population. A review by Loeffler et al. reported that Cannabinoids are more frequently used by young adults as well as the other drugs. Drug addiction and recreational drug use including SCs are more commonly observed in males. Socio-economic and cultural reasons are believed to be the reason for this phenomenon. (7) As discussed above, our data was compatible with the literature in terms of the socio-economic status, age and sex of patients with drug related presentations (8,9).

Government expenditures on the fight against drugs in Turkey were reported to be 127,180,397 USD in 2011 and 253,770,275 USD in 2013 (9) which shows a gradual increase in just 2 years. Emergency healthcare costs associated with drug use in USA was reported as 2,2 billion USD per year in 2011 (10). Unfortunately, we failed to identify any further research that shows similar data for Turkey. We believe by identifying the actual cost of drug related presentations to ED, law and policy makers may be influenced to focus their attention to prevent substance use rather than to treat its complications. For this reason, we believe our study fills the deficit regarding the emergency service costs of the patients who has drug related presentations.

Another interesting finding is that the use of OID was related with significantly higher costs compared to the use of SC even though the average costs are similar to each other. SCs related presentations are known to have more severe and long-lasting clinical symptoms (11), however since their symptoms are easily recognizable, we can argue that they need less diagnostic studies compared to OIDs as the main difference was in the cost of diagnostics, explaining the difference in cost.

It is known that SCs can cause a variety of clinical presentations because they are manufactured in a non-standard way by different suppliers and their contents change frequently. SCs show their effects via CB1 and CB2 receptors. CB1 receptors take part in glutamate and GABA neurotransmissions. These receptors play an active role in anxiety, psychoactive reactions, analgesia, audio-visual perception changes, motor function deficiencies, time perception and memory problems (12). The

affinity of SC to CB1 receptors and the strength of their affect on those receptors depends on their content, therefore the clinical presentation may be different with different batches of SCs (13-15). We believe the low potency of the SCs in the drug market during the period of our study may have caused their cost to be less than OIDs. More prospective, long-term studies are needed to objectively identify and analyze the true cost of illicit drug use to the emergency service.

Conclusion

Presentations to ED with illicit drug use and drug related complications contribute immensely to health expenses. More prospective and long-term studies are necessary to determine the true financial impact of these presentations to ED. This may create awareness in both public and policy makers to implement actions against drug use.

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