

# Comparison of Brain Magnetic Resonance Imaging Lesions in Opium Addict and Non-addict Patients with Thrombotic Stroke: A Case-Control Study

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## Original Article

### Abstract

**Background:** There is no consensus on the effect of opium on stroke yet. Some studies show the negative effects of opium on ischemic strokes. Here, we attempt to compare the volume of lesions in opium addict and non-addict patients with thrombotic stroke.

**Methods:** This case-control study was conducted on patients with thrombotic stroke at Shafa Hospital in Kerman, Iran. The diagnosis was confirmed by clinical examinations, imaging, and laboratory tests. The volume of lesions was calculated by magnetic resonance imaging (MRI), and the data were analyzed by descriptive statistics, Mann-Whitney U test, Chi-square test, and linear regression analysis.

**Findings:** A total of 60 patients were studied, 30 of whom were opium addicts and the rest were non-addicts. The mean volume of the lesion was  $46.008350 \pm 7.488990$  (in the addict group) and  $31.023335 \pm 1.441570$  (in the non-addict group), indicating a significant difference between the two groups ( $P = 0.005$ ). Regression analysis results showed a significant relationship between the volume of stroke with opium addiction ( $P = 0.017$ ), ischemic heart diseases (IHDs) ( $P = 0.006$ ), hyperlipidemia (HLP) ( $P = 0.016$ ), age ( $P = 0.035$ ), and smoking ( $P = 0.044$ ).

**Conclusion:** The results of this study showed a higher volume of lesion in opium-addict patients compared to that in non-addicts as an indicator of stroke severity.

**Keywords:** Opium; Thrombotic stroke; Magnetic resonance imaging

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## Introduction

Ischemic stroke is the most common neurological disorder causing mortality and various physical and mental disabilities. The frequency of ischemic stroke is growing with the rising prevalence of stroke risk factors.<sup>1</sup> The most prevalent form of ischemic strokes is large artery atherosclerosis, which is mainly caused by hypertension (HTN), hyperlipidemia (HLP), diabetes mellitus (DM), and smoking.<sup>1-4</sup> Recent studies have shown that there are additional factors (e.g., opium addiction) involved in the progress or clinical course of patients with thrombotic strokes. Morphine is the main active ingredient in opium. It has recently been shown that opium has destructive effects on blood vessels.<sup>5</sup> This negative influence has been shown in patients with myocardial infarction (MI).<sup>6</sup> Furthermore, some studies show a high prevalence of opium addiction in patients with stroke.<sup>7</sup> However, the pattern of cerebrovascular stenosis in opium-addict patients and non-addicts does not seem to be different.<sup>8</sup> Cerebrovascular sonography results indicate the exacerbation of cerebrovascular atherosclerosis in opium-addicts.<sup>9</sup> Conversely, the oral consumption of opium has been reported as a factor to prevent the incidence of ischemic stroke.<sup>10</sup> Given the prevalence of opium addiction and stroke and the lack of consensus on the influence of opium on stroke, we attempt to study the volume of stroke in opium-addict patients and non-addicts by brain magnetic resonance imaging (MRI).

## Methods

This case-control study was performed on 60 patients with thrombotic stroke hospitalized in the neurology ward of Shafa Hospital in Kerman, Iran. Patients with clinical suspicion of stroke referring to the emergency department for the first time underwent brain computed tomography (CT) scan, and those with intracerebral hemorrhage (ICH) were excluded from the study. The patients further underwent brain MRI, Doppler sonography, cardiac monitoring, and transthoracic echocardiography (TTE) and some of them, transesophageal echocardiography (TEE), and patients with embolic and lacunar strokes were excluded from the study. Patients with silent stroke, underlying disease [except for HTN, DM, HLP, and ischemic heart disease (IHD)], and patients consuming medications

[except for controllers of HTN, DM, HLP, and IHD] were also excluded from the study. Opium addiction was assessed according to the 10<sup>th</sup> version of the International Statistical Classification of Diseases and Related Health Problems (ICD10).<sup>9</sup> The patients were divided into two groups based on the addiction to opium and matched in terms of age and sex. The volume of lesions was calculated according to the ABC/2 formula based on DWI (1.5 T MRI Scanner).<sup>11</sup> According to the information of previous study<sup>8</sup> and by usage of sample size calculation software (PASS) (version 11), the sample size was calculated, 60 patients. The formula for calculating sample size for comparing two independent groups mean was used. The study was approved by the Ethics Committee of Kerman University of Medical Sciences (No: IR.KMU.AH.REC.1396.1264).

The SPSS software (version 22, IBM Corporation, Armonk, NY, USA) was used for the current study. The results were analyzed by descriptive statistics, Mann-Whitney U test, chi-square test, and linear regression analysis. The p-value was considered less than 0.050.

## Results

A total of 60 patients were evaluated, of whom 30 were opium-addict and the rest were non-addicted. In the addicts group, 15 patients were male and 15 females. In the non-addicts group, 17 patients were male and the remainder was female. The manner of consumption was oral (3 patients) or inhalation (27 patients) and the mean duration of opium consumption was 12 years but the amount of consumed opium was not clear exactly. The mean age of the opium-addict and non-addict patients was  $64.10 \pm 13.32$  and  $60.83 \pm 15.47$ , respectively, which was not significantly different between the two groups ( $P = 0.095$ ). Table 1 shows the frequency of variables between the two groups.

**Table 1.** Frequency of variables in the groups

Variable	Non-addict [n (%)]	Addict [n (%)]	P
DM	15 (50.0)	8 (26.7)	0.489
Sex			0.824
Male	17 (56.7)	15 (50.0)	
Female	13 (43.3)	15 (50.0)	
HTN	19 (63.3)	13 (43.3)	0.605
HLP	17 (56.7)	9 (30.0)	0.490
IHD	9 (30.0)	8 (26.7)	0.312
Smoking	3 (10.0)	13 (43.3)	0.040

DM: Diabetes mellitus; HTN: Hypertension; HLP: Hyperlipidemia; IHD: Ischemic heart disease

**Table 2.** Results of linear regression test for the variables

Model	Unstandardized coefficients		Standardized coefficients	t	P	95% CI for B	
	B	Standard error	Beta			Lower bound	Upper bound
Constant	15.910	38.986		0.408	0.685	-62.358	94.178
DM	11.477	19.614	0.077	0.585	0.561	-27.900	50.855
HTN	-3.307	19.192	-0.230	-0.172	0.864	-41.837	35.223
HLP	-51.973	20.752	-0.354	-2.505	0.16	-93.633	-10.312
IHD	62.663	21.982	0.388	2.851	0.006	18.533	106.793
Smoking	-45.583	22.113	-0.277	-2.061	0.044	-89.976	-1.189
Opium	50.635	20.475	0.348	2.473	0.017	9.529	91.741
Gender	-17.084	18.104	-0.117	-0.944	0.350	-53.430	19.262
Age	1.366	0.631	0.276	2.166	0.035	0.100	2.632

DM: Diabetes mellitus; HTN: Hypertension; HLP: Hyperlipidemia; IHD: Ischemic heart disease; CI: Confidence interval

The mean volume of the lesion was  $46.008350 \pm 7.488990$  in the addict group and  $31.023335 \pm 1.441570$  in the non-addict and there was a significant difference between the two groups in this regard ( $P = 0.005$ ). To control the effect of other confounding factors, linear regression model was used. The regression analysis results indicated a significant relationship between the volume of stroke with addiction to opium ( $P = 0.017$ ), cardiac ischemia ( $P = 0.006$ ), HLP ( $P = 0.016$ ), age ( $P = 0.035$ ), and smoking ( $P = 0.044$ ) (Table 2).

## Discussion

This study was conducted to assess the effect of opium addiction on the volume of lesions in thrombotic stroke patients. Our study is the first attempt in this field. Our findings showed that opium addiction increases the volume of lesions in patients with stroke. These findings were significant even after excluding other confounding factors, indicating a higher severity of thrombotic stroke in opium-addict patients that, consequently, increases the rate of mortality and morbidity. There was no similar study to compare our results, but numerous studies have assessed the relationship between opium addiction and stroke from different aspects. Hamzиеe-Moghadam et al. reported, according to Doppler sonography findings, an abnormality in intima-media thickness in opium-addict patients compared to non-addict ones, confirming the earlier occurrence of atherosclerosis in addict patients.<sup>9</sup> Moadabi et al. also showed, according to vascular sonography findings, that pulsatility index (PI) and mean flow velocity (MFV) of addict patients with stroke are more abnormal than those of non-addict ones.<sup>12</sup> Mousavi-Mirzaei et al. showed that the number of

atherosclerotic plaques is higher in addicted patients.<sup>13</sup> Hamzei et al. in another study, examined 105 patients with ischemic stroke and the healthy control group in terms of opium addiction. The findings suggested that opium addiction is significantly and independently higher in the patients' group.<sup>14</sup> They also found that despite the higher prevalence of opium addiction in patients with ischemic stroke, the pattern of vascular stenosis is not different from that of other patients with ischemic stroke.<sup>8</sup> Recent studies show that the administration of opium antagonists may exert therapeutic effects on patients with ischemic stroke.<sup>15</sup> Moreover, several studies have examined the association of opium addiction to IHD in Iran. All of these studies show a significant relationship between the prevalence of opium addiction and IHD.<sup>5,16-19</sup> The pathophysiology of opium on stroke is not clear. Opium addiction can increase plasma fibrinogen, which is a main risk factor for atherosclerosis.<sup>20</sup> Moreover, opium dependency can decrease immune system, which leads to infection that is a risk factor for cerebral infarction.<sup>14</sup> There are some evidences which declare that opium can increase atherosclerosis by affecting the lipid profile.<sup>21</sup> However, there are a few studies in opposition to the results of our study and similar studies published. For example, Juneja et al. in India found that there was no difference in national institutes of health stroke scale (NIHSS) and modified Rankin Scale (MRS) between addicted stroke patients with non-opium addicted patients at the time of admission and discharge.<sup>22</sup> In their cross-sectional study, Saberi et al. reported that there was no significant difference between the prevalence of opium addiction in the group of patients with stroke and healthy individuals.<sup>23</sup>

## Conclusion

In conclusion, our findings confirmed that opium addiction is associated with an increase in the volume of lesions in opium-addicted patients. Further studies are recommended given the widespread prevalence of opium addiction in the Middle East and Iran, the geographical location of opium production<sup>24,25</sup> and the association of mortality risk in the population with opium addiction.<sup>21</sup>

## Conflict of Interests

The Authors have no conflict of interest.

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## Authors' Contribution

The first and second authors contributed to all procedures. Other authors contributed to the collection of data, data analysis, and manuscript preparation.

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## مقایسه حجم ضایعات در تصویربرداری رزونانس مغناطیسی در بیماران سکته مغزی ترومبوتیک معتاد و غیر معتاد: یک مطالعه مورد-شاهدی

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### مقاله پژوهشی

### چکیده

**مقدمه:** هنوز هیچ اتفاق نظری در مورد تأثیر تریاک بر روی سکته مغزی وجود ندارد. نتایج برخی مطالعات نشان دهنده اثرات منفی تریاک روی سکته مغزی ایسکمیک می‌باشند. هدف از انجام پژوهش حاضر، مقایسه حجم ضایعات در بیماران معتاد و غیر معتاد مبتلا به سکته مغزی ترومبوتیک بود.

**روش‌ها:** این مطالعه مورد-شاهدی بر روی بیماران سکته مغزی ترومبوتیک بستری در بیمارستان شفای کرمان انجام شد. تشخیص بر اساس یافته‌های بالینی، تصویربرداری و تست‌های آزمایشگاهی بود. حجم ضایعات بر اساس MRI Magnetic resonance imaging محاسبه گردید و نتایج با استفاده از آمار توصیفی و آزمون‌های Mann-Whitney U،  $\chi^2$  و Linear regression مورد تجزیه و تحلیل قرار گرفت.

**یافته‌ها:** از ۶۰ بیمار مورد بررسی، ۳۰ بیمار معتاد و بقیه غیر معتاد بودند. اختلاف معنی‌داری در میانگین حجم ضایعه ( $7/488990 \pm 46/008350$ ) در بیماران معتاد و ( $1/441570 \pm 31/023335$ ) در بیماران غیر معتاد) بین دو گروه وجود داشت ( $P = 0/005$ ). نتایج آنالیز رگرسیون، ارتباط معنی‌داری را بین حجم ضایعه با اعتیاد ( $P = 0/017$ )، ایسکمی قلبی ( $P = 0/006$ )، هایپرلیپیدمی ( $P = 0/016$ )، سن ( $P = 0/035$ ) و مصرف سیگار ( $P = 0/044$ ) نشان داد.

**نتیجه‌گیری:** حجم ضایعات بیشتر در بیماران معتاد نسبت به غیر معتادان، بیان‌کننده شدت سکته مغزی می‌باشد.

**واژگان کلیدی:** تریاک؛ سکته مغزی ترومبوتیک؛ تصویربرداری رزونانس مغناطیسی

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