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Stroke profile in Afghanistan and Nepal

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Abstract

Background and Objective: Stroke is a major health issue in semi-industrialized countries. We studied the stroke profile and risk factors of two semi-industrialized countries - Afghanistan and Nepal that were "least talked about" in the literature. *Methods:* We searched the database PUBMED, BVNA (http://www-ient.unilim.fr/), SCOPUS, www.ajol.info, WHO InfoBase, using the keywords "Afghanistan", "cardiovascular", "cerebrovascular", "diabetes, "epidemiology", "hyperlipidemia", "hypertension", "incidence", "Nepal", "population-based", "prevalence", "smoking", and "stroke". *Results and Conclusions:* Based on population and hospital studies, stroke is common with low mean age especially in women, significantly high prevalence of hemorrhagic strokes and possibly more severe. Age-adjusted death rate is higher in Afghanistan than Nepal. Observations from stroke and stroke-free subjects show that smoking is more important risk factor than hypertension in both countries. Hypercholesterolemia, overweight and alcoholism show relatively minor, but important correlation with stroke. Type 2 diabetes mellitus is a growing problem in Nepal especially in urban than semi-urban and Everest regions. There is no information on Type 2 diabetes mellitus from Afghanistan. A low rate of BMI ≥25 kg/m^2 in Afghanistan is observed. For Nepal, with increase of age and life expectancy, predisposition to cardiovascular disease should be high. Age is not an immediate risk for Afghanistan since those 65+ and 80+ years are projected to remain stable or elevate slightly over the next 30 years.

INTRODUCTION

Our knowledge on stroke epidemiology stems from the population based studies that are mainly conducted in the industrialized countries where although the stroke mortality has reduced, stroke related disabilities remain high. Semi-industrialized countries on the other hand, demonstrate both high stroke mortality, accounting for more than 80% of all stroke deaths globally and stroke related disabilities.[1-2] The semi-industrialized countries are reported to have a higher (7-fold) disability-adjusted life years (DALY) than that observed in industrialized countries.[1] The burden of stroke is therefore particularly strong in semi-industrialized countries. These burdens are projected to increase in the future for three reasons: (1) Large and increasing population with more than half of the world's population resides in the semi-industrialized countries; (2) High prevalence of several modifiable stroke related risk factors; (3) Aging population in these countries.[3-5]

Despite the importance of stroke in the semi-industrialized countries, there have been very few population based investigations on stroke in these countries. It is indeed necessary to pay greater attention to these countries to understand their underlying problems and challenges in stroke. The objective of this study was to explore the stroke profile in two semi-industrialized countries that have been "least talked about" in the international medical literature, i.e., Afghanistan and Nepal.

METHODS

Both Afghanistan and Nepal are the "least talked about" in international medical literature, based on the number of past studies (population-, hospital-based and reviews) conducted on stroke. Also, Afghanistan and Nepal have similar economic and demographic structure, making them a good combination. The GDP at official exchange rate is 12.85 billion US dollars for Afghanistan and 12.64 billion US dollars for Nepal. The unemployment rate is 40% in Afghanistan and 42% in Nepal. The population median age is 17.6 years for Afghanistan and 20.8 years for Nepal. The at-birth sex ratio is 1.05 (Males/Females) for Afghanistan and 1.04 (Males/Females) for Nepal.[6]

We used original data extracted from two studies previously conducted by our group, i.e calculating worldwide trends in stroke incidence and case

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fatality, and revising the ideal stroke incidence study (ISIS) criteria. This is in addition to search from the main database sources. We searched 6 database, they are: (1) PUBMED (2) SCOPUS (3) BVNA (Bibliothèque Virtuelle de Neurologie Africaine, http://www-ient.unilim.fr/ (4) www.ajol.info (database of >320 journals, health and non health, from 25 African countries); (5) African Journal of Neurological Sciences, and (6) WHO InfoBase. The search was up to 1st March 2009. The keywords searched were: "cardiovascular", "cerebrovascular", "diabetes", "epidemiology", "hyperlipidemia", "hypertension", "incidence", "population-based", "prevalence", "smoking", "stroke" and names of the two countries.

We used similar methods in the search from all databases. Since we expected minimal stroke data, all population-and hospital-based studies were included, if there were information on stroke incidence, prevalence, mortality, hospitalisation, and risk factors. Results were described as originally reported. We also held meetings for discussion whenever necessary. We also manually checked references from other sources for any relevant studies. No restriction was made for language or year of study. Our focus was on studies that looked at "resident" population in these countries and not focussing on the differences between various ethnic groups within Nepal or Afghanistan.

RESULTS

We could not compare the data from the two countries since data was minimal, and disparities in data sources and study methodologies made such a comparison complicated. We therefore present and discuss results for each country separately. Based on the search in the original two studies previously conducted, we had extracted 3,199 abstracts. Other relevant reviews or studies covering wider geographical areas were also reviewed. With the additional search performed for this study, we extracted 154 articles that in some ways were related to the health problem in Nepal and Afghanistan. However, none was a prospective population based study on prevalence, incidence, mortality, or hospitalization of stroke or associated diseases in Afghanistan or Nepal. We could only find surveys on stroke related risk factors for Afghanistan and Nepal and are therefore discussed here.

Afghanistan

Prevalence and Incidence surveys

There were no surveys on the prevalence and incidence of stroke in Afghanistan identified.

Stroke mortality and hospitalisation surveys

There was no population based surveys on mortality of stroke in Afghanistan found. According to WHO estimates, cerebrovascular diseases accounted for 118.6/100,000 deaths (age-standardised death rate) in 2002 with a total disability adjusted life years (DALY) rate of 908/100,000.

Stroke related risk factors

There was no national survey on stroke related risk factor found. Three regional surveys (both population and hospital based) were performed that reported on three stroke related risk factors: overweight, hypercholesterolemia and tobacco use. A clinically stroke-free population-based nutrition and health survey in the Badghis province showed a prevalence of BMI ≥30 kg/m^2 to be 1.8%, and BMI ≥25 kg/m^2 to be 11.5%. The mean BMI was 21.1 kg/m^2. The study population consisted only of women of 15-49 years. The sample size was small (n=555) (2002 data).[7] The mean BMI of this study matches well with the result from another study involving young women with mean age of 25.3 years. This second study investigated the social stressors, mental health, and physiological stress in the urban elite of young Afghans (stroke-free university students) in Kabul.[8] This second study also showed that a high blood pressure (>130/85 mmHg) was prevalent in 14.3%; 18.5 in men, and 10% in women (n=161). This hypertension prevalence matches well with the third study that yielded a prevalence of 11.22% (13-82 years, n=1,559). However, it was unspecified what cut offs for the hypertension were used in the third study. Also, hypertension, diabetes mellitus and coronary artery diseases were significantly more common in women than men in all age groups in the third study. This could partially be explained by the sample size which was higher for women in all age groups for all parameters.[9]

The tobacco use was found to be very high in some populations in Afghanistan. A hospital based survey of 297 stroke-free individuals showed a prevalence of tobacco use (in any form) in 82% of males and 17% of females (1990 data).[7] A high

use of tobacco has also been reported in stroke-free school children, between 13-15 years of age, both males and females, in a more recent (2002 data) population based survey (n=1,567) that was conducted in 4 provinces of Afghanistan (Maidan Wardak, Logar, Parwan and Nangarhar provinces). The survey showed tobacco use (at least one time use in a preceding month) in 21.7% and 11.2% of males and females respectively.[7] These rates are lower in Kabul, a comparatively more urban area, in the same age group (stroke-free school students), at 15.4% and 5.4% in males and females respectively.[7] A very high prevalence (44%) of stroke-free people with total cholesterol ≥ 6.5 mmol/L (250 mg/dl) has also been reported in a hospital based survey (n=3,600).[7]

Age is the most important non modifiable risk factor in stroke. In Afghanistan, the population of those above 65 years has decreased slightly since 1950 (from 2.6% to 2.2%). However, those above 80 years has increased during the same period (from 0.1% to 0.2%, 2005 data). In the next 30 years, those above 65 years are projected to increase slightly (from 2.2% to 2.5%), and those above 80 years are projected to remain stable at 0.2%. Also, the life expectancy has shown an increase since 1950 and is projected to be 52.8 years from the current figure of 42.8 years.[10] Therefore, age may not be such an important consideration in the risk factor of stroke in Afghanistan, since the life expectancy is not expected to spread over to the age group with high risk of stroke (>65 years).

Discussion

Due to the limited nature of the available literature, it is difficult to create a stroke profile for Afghanistan population. Stroke is a lifestyle disease and innumerable factors can increase or decrease the stroke risk in any given population, among the important factors are tobacco use (in any form), hypertension, overweight, obesity, alcoholism, and hypercholesterolemia. Of the stroke related risk factors, tobacco use represents the most urgent challenge for Afghanistan, since its use is high and is common among both men and women, including children as young as 13 years, in both rural and urban regions. This is important since a number of studies suggests a 2-3 fold increase in stroke risk (of either type) with the use of tobacco (in any form).[11-14] Those countries which show a low smoking prevalence such as Chad, Mali, Senegal, Ivory Coast, Oman, UAE, and Bahrain exhibit low number of deaths from stroke. Countries which show high rates for smoking (60% and above) such as Laos, Kyrgyzstan, Mongolia, Bangladesh exhibit high rates of stroke related mortality and DALY loss.[14]

The cholesterol levels recommended for optimum stroke prevention is 200 mg/dl. On one hand, low total cholesterol (<180 mg/dl) significantly increases the risk for hemorrhagic strokes. On the other hand, increase in total cholesterol increases the risk for ischemic stroke excluding cardioembolic strokes.[15-20] The available surveys from Afghanistan recorded information on total cholesterol, which is not as reliable indicator as lipoprotein fraction of cholesterol in determining coronary heart diseases and stroke.[21] A high prevalence (44%) of people with total cholesterol ≥ 6.5 mmol/L (250 mg/dl) that was observed in a hospital based survey in stroke-free cases (n=3,600) may suggest high propensity for ischemic stroke in this population, based on hypercholesterolemia factor alone. This may not be an accurate estimate; as it was a hospital based study with limited population representations. Countries such as Gambia, Pakistan, Saudi Arabia, and Nigeria which have low percentage of high total cholesterol levels also have lower deaths from stroke. For example, Pakistan has total cholesterol levels of 3-4.99 mmol/l, and the number of stroke deaths is within 10.000-99.000. However, neighbouring India has a total cholesterol level of 5- 5.49 mmol/l, and the stroke deaths of over 200.000 (2005 data).[14]

Afghanistan surveys reported a moderate prevalence of 13.3% that had a BMI of at least 25 kg/m^2. This moderate prevalence may still be significant since these were based on a small sample population consisting of females only. This also indicates beginning of dietary transitions in this population of Afghanistan. Obesity is a well known risk factor for cardiovascular disease in Western countries.[22-24] Persons with BMI ≥30 kg/m^2 have 1.5- to 3-fold higher mortality from cardiovascular disease.[24] And those with BMI ≥ 27.0 kg/m^2 have nearly 2-fold excess mortality from coronary heart diseases.[23] Obesity is less frequent in Afghanistan than in many other countries. Current rates of obesity are 20% in the United States and 15% in Canada.[25] The BMI values observed above shows good nutritional status. However, this may not be representative of all Afghanistan. A previous study has reported high percentage of dietary energy deficit (~490 kilocalories) and a 40% malnutrition rate in Afghanistan.[26]

No information on diabetes or blood glucose was available for resident population of Afghanistan. Although age is not an immediate risk factors in Afghanistan, in view of the high prevalence of tobacco use, hypercholesterolemia, hypertension at young age especially among women, and slight expected increases in age and life expectancy over a period of next 30 years, appropriate primary prevention strategies may need to be instituted for early control of risk parameters of stroke, before it grows into a major burden.

Nepal

Incidence and prevalence surveys

There was no incidence studies identified. A hospital based study (2006 data) yielded 150 CT-confirmed stroke cases over a period of one year (104 males and 46 females), with age as young as 7 years, and with 42% having hemorrhagic (intracerebral and subarachnoid) strokes.[27] On the other hand, another retrospective hospital study yielded only 72 cases of stroke excluding TIA over a period of 5 years (2005 data) and reported that 15.3% of all stroke patients were < 45 years of age[28], and was more common in females by a factor of 2.6. However, the second study may have been biased by the lack of use of CT scanning and exclusion of TIA cases.[28]

Stroke mortality and hospitalizations

There was no population based surveys on stroke mortality found. According to WHO estimates, cerebrovascular diseases accounted for 107.5/100,000 deaths (age-standardised death rate) from cerebrovascular diseases in 2002 with a total DALY rate of 543/100,000.

Stroke related risk factors

In Nepal, those aged >60 years constitutes about 6.5% of the population (2001 data).[29] The population growth rate for those >60 years is increasing more rapidly than annual overall population growth rate (3.39%, 2.3%, respectively) (2001 data).[29] The proportion of population above 65 years has decreased slightly since 1950 from 4.1% to 3.7%. However, the proportion of population above 80 years has remained stable during the same period, both at 0.4%, 2005 data). In the coming 30 years, the proportion of population above 65 years is projected to increase nearly 2-fold from 3.7% to 6.3%, and those above 80 years to increase by 2-fold from 0.4% to 0.8%. Also, the life expectancy has shown an increase since 1950 and is projected to be 72.4 years in the next 30 years from the current figure of 63.8 years.[10] Therefore, ageing population and increasing life expectancy appears to be a major non-modifiable risk factor for predisposing to the cardiovascular diseases including stroke in Nepal. The mean age that is reported in stroke cases is 61 years[30] and 61.7 yrs ±14.9 years[28] in Nepalese studies.

There were a few hospital based studies that described the risk factors associated with stroke. A hospital based study reported high smoking (58.3%), hypertension (47.2%), alcohol consumption (41.4%), atrial fibrillation (12.5%) and type 2 diabetes mellitus (11.1%) rates in the stroke patients.[28] Similar high rates of smoking (40.66%) and hypertension (40%)[27] was reported in stroke cases in a one-year hospital based study, and even higher smoking (61.0%) and hypertension (60%) rates were reported in a two-years hospital based study among the stroke patients.[30] Thus, smoking may be even a more important modifiable risk factor for stroke than hypertension in Nepal, although the optimum control of hypertension is also crucial.

Type 2 diabetes mellitus is a public health challenge in Nepal in both urban, semi urban and the Everest areas. All studies mentioned here are based on stroke-free population. A cross sectional population based study in semi-urban area showed a low prevalence of diabetes mellitus (4.1%).[31] A higher prevalence rate was observed in another semi-urban population based study (9.5%).[32] In urban Nepal, the prevalence is higher than semi-urban areas. The age and sex standardized prevalence of diabetes, impaired glucose tolerance and impaired fasting glycaemia were 19.0%, 10.6% and 9.9%, respectively in a population based study. The prevalence of type 2 diabetes mellitus and impaired fasting glycaemia is higher in men than women in all age groups in both urban and semi-urban areas and increases with age. Prevalence of impaired fasting glycaemia is highest among middle age men whereas the prevalence of type 2 diabetes mellitus is highest among older men.[32-33] The diabetes risk seems to be low in Sherpa adults (except impaired fasting glycaemia) living in the Everest area than in Kathmandu city as observed in a cross-sectional survey. The respective prevalence for the Kathmandu city and Everest region were: any impaired glucose regulation (55.4% vs. 23.5%), impaired fasting glycaemia (42.1% vs. 14.3%),

isolated impaired glucose tolerance (1.7% vs. 0.8%), and combined isolated impaired fasting glycaemia and isolated impaired glucose tolerance (11.6% vs. 8.4%).[34]

Discussion

The three most important characteristic features of stroke in Nepal are, firstly its low mean age particularly in women. This is similar to that found in some other studies from elsewhere (1.5-3.0 fold).[35-37] Secondly, a significantly high prevalence of hemorrhagic strokes, and thirdly, its severity. One retrospective hospital study reported that 15.3% of all stroke patients were < 45 years of age[28], and was more common in females by a factor of 2.6. However, the proportion of stroke < 45 years of age is even higher in studies reported from India (18.0%), South Africa (35.0%), and Qatar (18%).[36,39-39] A hospital based study from Nepal reported a very high proportion of hemorrhagic strokes (42%).[27] Cerebral aneurysm is the most common cause of subarachnoid hemorrhagic strokes, accounted for about 80% of all subarachnoid hemorrhage cases. Apart from inborn arterial abnormalities, cardiovascular risk factors such as chronic smoking and chronic alcoholism are also associated risk factors. Such association may be important in Nepal, which showed very high levels of smoking in stroke patients, and also high proportion of hemorrhagic strokes, both intra-cerebral and subarachnoid.[40-41] High proportion of subarachnoid hemorrhages may thus be expected in this region, and the high mortality and severe disability associated with hemorrhagic strokes.[42-46]

Low stroke mortality is reported at high altitude in several population based studies in India and Ecuador.[47-48] Blood pressure decreases with an increase in altitude and flattening off at or beyond 3,000m. On the other hand, hematocrit and hemoglobin levels increase exponentially with altitude. It may therefore be interesting to evaluate the outcome of this contrasting combination of blood pressure decline and increase in hemoglobin and hematocrit levels, since this effect may vary in relation to different altitudes and difference in the underlying risk factor(s) in a given population. Nepal is located in high altitude. It would be interesting to investigate whether the altitude may impact on stroke mortality in Nepal.

The mean age that is reported in stroke cases is 61 years[30] and 61.7 yrs ±14.9 years[28] in Nepalese studies. This is lower than many other studies, e.g., Mumbai (66 ± 13.60 years), Barbados (72.5 ± 14.8 years), Dijon (France) (66.0/67.8 years in 1985 to 71.1/75.6 in 2004 for men/women.) or Novosibirsk (Russia) (64.8±13.1 years, 62.7±12.6 years in men and 66.9±13.3 years in women). This may reflect the younger mean age of the population. Alternatively, the stroke risk may occur at younger age in Nepal than in the western populations.

Like other semi-industrialized countries, Nepal seems to be undergoing transition resulting from a widening gap between rich and poor, an aging population and by increasingly adopting unhealthy lifestyles. Hypertension and type 2 diabetes mellitus are significantly prevalent in Nepalese population. Smoking is the chief stroke related challenge in Nepal, suggesting possible increased stroke burden in the coming years.

COMPARING AFGHANISTAN AND NEPAL

The data from the two countries are summarized in Table 1. No incidence surveys were identified for Afghanistan and Nepal. The hospital based prevalence surveys for Nepal only showed a high rate of hemorrhagic strokes (42%). Based on studies extracted, the risk for stroke is particularly high in Nepalese men than women. No information exists for Afghanistan, but hemorrhagic strokes should also be high in men and women since smoking is very much prevalent in the population, both men and women including children. Thereby any comparison of Nepal and Afghanistan is limited in this regard. Stroke mortality and cerebrovascular DALY loss are much higher for Afghanistan than Nepal (Table 1), this could partially be explained by the levels of healthcare services, patient awareness and motivation for self-care, cost etc.

The BMI information was available from Afghanistan population based surveys showing 11.5-16.1% for BMI ≥25 kg/m^2, and BMI ≥30 kg/m^2 in only 1.8% of the women only population studied. Thus, high BMI does not seem to be an immediate risk factor in Afghanistan, similarly overweight, obesity and type 2 diabetes mellitus. Similar patterns are expected in Nepal as well since poverty and lack of availability of enough food regularly is a major health and moral issue. Poverty is a major problem in both countries, and so will be the level of nutrition and BMI in the population.

Hypertension is a major stroke risk factor in industrialised countries. This is probably the case in Afghanistan, where the prevalence of

Table 1: Comparison of Afghanistan and Nepal

Parameters	Afghanistan	Study info Afghanistan	Nepal	Study info Nepal
Incidence	x	x	x	x
Prevalence	x	x	[n=150 over 1 year (M=104, F=46), as young as 7 years, 42% Hemorrhagic]/[n=72 over 5 years]	Both Hospital based inpatient stroke cases] [27-28]
Mortality and DALY rates	118.6/100,000* DALY rate =908/100,000	WHO data [7]	107.5/100,000* DALY rate=543/100,000	WHO data [7]
BMI ≥25 kg/m^2 Bagdhis/ BMI ≥25 kg/m^2 Kabul/ BMI ≥30kg/m^2 Bagdhis	[11.5%/1.8%/ 16.1%]	All population based [555 stroke free women] /[161 stroke free students]/[555 stroke free women] [7-8]	x	x
HTN (>130/85 mmHg) (Kabul) HTN (cut-off unknown) (Kabul)	[18.5/10/14.3% as M/F/both]/ [11.22% as M+F)]	All population based [161 stroke free students]/[1559 stroke free] [8-9]	40-60% (cut-off unknown)	Hospital based stroke cases [27-28,30]
Tobacco (Avicenna) Tobacco (Maidan Wardak, Logar, Parwan, Nangarhar) Tobacco (Kabul)	[82/17% (M/F)]/ [21.7/11.2/19.6% (M/F/both)]/ [15.4/5.4/12.0% (M/F/both)]	[297 stroke free]/ [1567 stroke free children]/ [1498 stroke free children] All population based [7]	40.66-61%	Hospital based stroke cases [27-28,30]
Hypercholestrolemia TC≥ 6.5 mmol/L (250 mg/dl)	44%	[3600 stroke free Hospital based] [7]	x	x
Alcoholism	x	x	41.4%	Hospital based stroke cases [28]
AF	x	x	12.5%	Hospital based stroke cases [28]
T2DM	x	x	[11.1%]/[4.1-9.5%]/ [19%]	[Hospital based stroke cases]/[semi urban stroke free population based]/ [urban stroke free population based] [31-34]
Any blood glucose abnormality	x	x	[10.6% (IGT)]/ [9.9% (IFG)]	Both population based stroke free urban [33]

Legends: AF: Atrial fibrillation; BMI: Body mass index; DALY: Disability adjusted life years; F: Females; HTN: Hypertension; IFG: Impaired fasting glucose; IGT: Impaired glucose tolerance; M: Males; TC: Total cholesterol; WHO: World health organisation; x: data not available; *age-standardised

hypertension varies from 11.2-14.3% in stroke-free cases, and up to 60% among stroke cases in Nepal. Although the data from the two countries are not directly comparable, it appears that hypertension may be a more important risk factor in Nepal than in Afghanistan, although the studies done in Afghanistan are limited in both size and number. Afghanistan has the major stroke related risk in the form of tobacco use that is present in individuals as young as 13 years. The age of smoking onset in Nepal is unknown to us, but smoking is highly prevalent (61%) among stroke cases based on hospital based studies. So, smoking is the risk factor that is common to both Afghanistan and Nepal. Alcoholism information was available from Nepal only. It showed high prevalence rate among stroke cases in hospital based studies (41.4%), so is the hypercholesterolemia (total cholesterol 6.5 mmol/L, 250 mg/dl) (44%) and atrial fibrillation (12.5%). Type 2 diabetes mellitus is another important stroke risk factor. No data exists for Afghanistan. In Nepal, the prevalence among stroke cases is 11.1% based on hospital based studies, and varies from 4.1-9.5% in semi urban and up to 19% in urban Nepal based on population based studies in stroke-free cases. The effect of altitude is seen in Nepal with low prevalence of impaired glucose regulation, impaired fasting glycaemia, impaired glucose tolerance and impaired fasting glycaemia plus impaired glucose tolerance in Sherpa population in Everest region based on cross sectional survey among stroke-free cases.

CONCLUSIONS

Valuable information can be extracted from the scarce studies on stroke in these two countries, although explicit conclusions on the stroke prevalence, incidence or hospitalisation rates cannot be deduced from the currently available literature. Stroke is a multi-factorial preventable lifestyle disease and innumerable factors can contribute to the stroke burden and its trends in any given population. Increases in age and life expectancy in the two populations predispose them to lifestyle related cardio-and cerebrovascular disorders for which age is an important risk factor. Stroke had high presentation at a low mean age, especially in women and had significantly high prevalence of hemorrhagic strokes and may possibly be have high severity and low survival in these populations. Stroke risk seems to be particularly significant in women. Smoking seems to be the more important risk factor than hypertension in both countries, although both smoking cessation and optimum hypertension control should remain the key in the stroke prevention and control in these two populations. Hypercholesterolemia, overweight and alcoholism show relatively minor, yet important correlation with stroke. Appropriate primary prevention programmes for encouraging smoking and preventive hypertension therapies are immediate needs. It is important in this region to identify early the at-risk population. Population based epidemiological investigation on stroke are urgently needed to quantify the stroke risk and "true" stroke burden in these two countries.

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