RESEARCH ARTICLE

Tobacco Use and Effects of Professional Advice on Smoking Cessation among Youth in India

Siddardha G Chandrupatla[1]*, Mary Tavares[1], Zuhair S Natto[1,2]

Abstract

Objective: Healthcare professionals and addiction programs play important roles in tobacco use prevention and cessation activities. In this study, we analyzed the prevalence of tobacco use and the impact of smoking cessation advice through programs/professionals among a nationally representative sample of youth in India. **Methods:** The data were obtained from the Global Youth Tobacco Survey (GYTS) 2009 dataset from a nationally representative school based survey of 8th to 10th grade students in India (n=14,543). Professional or provider advice for smoking cessation was analyzed with reference to quitting smoking. Descriptive analysis was performed for tobacco and smoking prevalence and the types of tobacco products used. Logistic regression was employed to assess any associations between professional or program advice and quitting smoking. **Results:** The overall prevalence of current tobacco use was 13.5%. About 76% were never tobacco users and 9.3% were former tobacco users. The prevalences of smoking, smokeless tobacco and poly tobacco use among current tobacco users were 35.1%, 43.3% and 21.5% respectively. Among the never smokers, 80% were weakly and 20% were strongly susceptible. Recipients of advice from a program or professional showed higher odds (OR=5.3) of quitting smoking. **Conclusion:** Professional and program advice to quit smoking is very effective for youth in India. More programs and healthcare professionals must be employed to prevent and encourage youth to abstain from the use of tobacco.

Keywords: Smoking cessation- Tobacco use cessation- adolescent- smokeless Tobacco- physician's role-COTPA

Introduction

India ranks third in global tobacco production and consumes almost 50% of its produce domestically (IBEF; Jhanjee, 2011). Smoking tobacco exposes the smoker to more than 7,000 chemicals, of which nearly 250 and nearly 69 chemicals are proven harmful and carcinogenic respectively (Potera, 2011; Salem et al., 2013). Smoking has the potential to affect every part of the body and cause many diseases such as aggravation of asthma and respiratory, cardiac diseases. Second hand smoking exposure also exposes to the diseases such as, sudden infant death syndrome, middle ear infections, chronic respiratory diseases, low birth weight, periodontitis and carcinomas' such as lung oropharyngeal, prostate carcinoma etc (Potera, 2011; WHO, 2014a). Annually, tobacco usage is associated with 6 million deaths worldwide. Non communicable diseases account for nearly 63% of the deaths in the world, and tobacco is one of the major contributing factor for the preventable deaths (WHO, 2015).

Oral cancer caused by smoking attributes for 71% of deaths in high-income countries and 37% of deaths in low-income countries (Torre et al., 2015). Oral and Lung cancers account to more than 30% of all the cancers in India and accounts for nearly 15% of the total global tobacco related illnesses and more than 1 million people die due to tobacco use each year (Ezzati et al., 2005; Jha, 2009; WHO, 2014b). In India, about 45% of all cancers among males and 17% among females and about quarter of oral cancers are attributable to tobacco use (NCDIR-NCRP, 2012). Parental smoking results in higher odds of asthma among the children (Singh et al., 2016).

Introduction to dangers of tobacco use and promoting tobacco cessation among youth are important strategies to control the use of tobacco. Adolescents in particular are more vulnerable and initiate tobacco use due to their family, societal and other surrounding influences (Lal et al., 2016). The tobacco usage habit tends to continue into adulthood with 9 out 10 smokers smoking their first before the age of 18 years (CDC). In India, 14.6% of adolescents use some form of tobacco, of which, 12.5% is in the form of smokeless tobacco. Mere 4.4% of school going children smoke cigarettes, which showcases the importance of accounting for other forms of tobacco in India and southeast Asia regions (Gajalakshmi and Kanimozhi,

[1]*Department of Oral Health Policy and Epidemiology, Harvard School of Dental School, 188 Longwood Ave, Boston, MA-02115, USA, [2]Department of Dental Public Health, School of Dentistry, King Abdulaziz University, Jeddah, Saudi Arabia. *For Correspondence: siddardha.gowtam@gmail.com*

2010). The prevalence of tobacco usage among youth has increased between 2006 and 2009 (Gajalakshmi and Kanimozhi, 2010).

Many models have been targeted towards healthcare professionals to help tobacco users to quit their usage, such as the 5A's, AAR, 4R's models, motivational interviewing etc. The basis for these models is asking and assisting the subjects their smoking and tobacco use habits (Fiore MC, 2008). In a survey conducted in 2012, majority of the doctor's (90%) ask and advise their patients to quit smoking (Warren et al., 2013). In comparison, nearly 70% of doctors in India routinely ask and assist their patients to quit smoking (Thankappan et al., 2009; Saud et al., 2014).

The Indian government amended many laws such as the one in 1978 and the COTPA (The Cigarettes and Other Tobacco Products Act) in 2003 to decrease tobacco use. In line with the COTP act the Ministry of Health in India laid down guidelines for health professionals, schools and several other key players in ways to prevent tobacco exposure among children and teens (India, 2003; Government of India, 2009; Selvavinayagam, 2010). Based on these evidences, the objectives of this research were, 1) to assess the prevalence of tobacco use, and 2) to evaluate the relationship between self- reported professional/ program advice for tobacco cessation and the quitting of smoking among 8th to 10th class students in India.

Materials and Methods

Survey components

The current data was obtained from the publicly available Global Youth Tobacco Survey (GYTS) 2009-survey dataset for India. GYTS is a school-based cross sectional survey conducted in many countries as part of tobacco monitoring system under the WHO's tobacco free initiative (TFI). It was conducted amongst a nationally representative sample of students of 8th to 10th grades. Sample design is a two-stage cluster sampling, randomized in the second stage during the selection of the grades within the schools. GYTS questionnaire, multiple-choice based survey, contains 56 core questions and additional supplemental questions specific for the given country. The GYTS survey was conducted twice in India, i.e. 2006 and 2009. A Total of 14,543 subjects were selected for the survey in 2009, of which 11,768 completed it with a response rate of 80.9%. The survey collected data about attitude, beliefs towards tobacco, cessation of tobacco and school curriculum.

Measures

Tobacco use in the population was assessed by their use of cigarettes, bidi, or smokeless tobacco products. Based on that, we have three categories: Never, current and former tobacco users. Data was classified also to ever vs. never users. Ever tobacco users are a combination of current and former tobacco users. Ever smokers are a combination of current smokers and former smokers.

'Never tobacco user' was defined as anyone who answered, "I have never chewed/applied/used snuff tobacco / smoked", for the questions "Do you think you

would be able to stop smoking/ chew tobacco if you wanted to?" (CR37 and INR 68). 'Never smokers' was defined as anyone who answered, "I have never smoked", for the question no "Do you think you would be able to stop smoking, if you wanted to?" (CR37).

'Current tobacco user' was defined as anyone who answered either 'Yes' or 'No" for the questions "Do you think you would be able to stop smoking/ chew tobacco if you wanted to?" (CR37 and INR 68). All those who answered, "I do not chew/apply/use snuff tobacco / smoke now", for the above questions, were categorized as 'Former tobacco users'.

'Current smokers' was defined as anyone who answered either 'Yes' or 'No" for the question- "Do you think you would be able to stop smoking, if you wanted to?" (CR37). All those who answered, "I do not smoke now", for question CR37, were categorized as 'Former tobacco users'. Former smokers are considered as those who have smoked previously, but have stopped smoking now, and therefore, can be called as 'those who have quit smoking'. Current smokers can also be classified as 'did not quit smoking'.

Never smokers are further categorized into 'low' or 'high' susceptibility categories to smoke in the future. 'Low susceptible' are those who answered 'definitely not' for the questions (1) "If one of your best friends offered you a cigarette, would you smoke it?" and (2) "Do you think you will smoke a cigarette at any time in the next year?" Any option, other than "definitely not" were classified into 'High susceptibility' category.

The professional advice reception was defined by the question, "Have you ever received help or advice to help you stop smoking?". Anyone who answered either "Yes, from a program or professional" or "Yes, from both programs/professionals and from friends or family members" were defined as the smokers who got professional advice or help for smoking cessation. Former smokers and current smokers were assessed for professional advice.

Statistical analysis
Power analysis

The power for the test was calculated using the logistic regression model. We achieved a power of value 0.99 for the given values from regression analysis- alpha level at 0.05, total sample size of 289 (totals from table 4), odds ratio of 5.3 and R^2 value of 0.4.

The prevalence of tobacco products usage was calculate for the entire population, as well as subcategories of population, based on sex, grade and age group. Chi-square test was used to assess the correlations between different categories of tobacco users and predictors. Logistic regressions was performed to measure the association between current smoking status among 'ever smokers', i.e. currently smoking (current smokers) or have quit smoking (former smokers), for receiving of professional advice for smoking cessation. Adjusted logistic regression model was utilized to derive the results. The variables 'FinalWgt' was used as sample unit weight, 'PSU' as primary sampling unit and 'Stratum' as strata. All the analyses were conducted using Statistical Analysis

Software version 9.3 (SAS, 2011).

Results

Demographic characteristics of study population

Table-1 describes the characteristics of the survey participants according to their tobacco use history. Tobacco use can be either cigarettes, bidi and many of the smokeless forms of tobacco products available in India, consumed exclusively or in combination. Three-fourth (76.95%, n=9240) of the school students in India have never tried any form of tobacco. This 76.95% translates to about 2,75,64,102 individual school going youth in India. Among the never tobacco users, 53.73% were males and 44.7% were females. Students of the age group 14-15 years had the highest proportion of current, former and never tobacco users. The proportion of subjects among never smokers decreases from 8th grade to 10th grade (38.5% to 27.15%).

About 13.5% (n= 1462) and 9.3% (n=1049) students were current and former tobacco users respectively. The students of 8th grade (40.92%) have higher proportion of current tobacco users compared to 9th (28.11%) and 10th (30%) grades. Former tobacco users were 9.33% of the total sample, of which 65.58% were males and 30.5% were females. Among the total sample, 13.53% of the subjects (n=1,462) are currently using tobacco products. When comparing the gender of the current tobacco users, 69.3% of the current tobacco users are males and 28.83% are females.

*Prevalence of dif*ferent forms of tobacco among current tobacco users

Table 2 shows the study population according to the method of tobacco products consumption. The subjects consumed tobacco either in the form of smoking or smokeless or both. Polytobacco users are those who used to smoke and use smokeless form of tobacco. When comparing the form of tobacco consumed, 43.3% use smokeless tobacco, 35% of the subjects smoke cigarette or bidi and 21.5% are polytobacco users. The most common form of tobacco consumed among Indian youth is smokeless or chewable form, consumed exclusively by 43% of the current tobacco users and another 21.5% of polytobacco users.

Females were more likely to use smokeless form of tobacco than smoke, i.e. 6,40,067 females use smokeless form compared to 3,29,866 smokable form and 2,59,145 polytobacco users. More number of the subjects, within the subgroups of grade and age, were likely to be using smokeless form of tobacco compared to polytobacco use or smoked tobacco. The youth of age group 14-15 years are the consumers of tobacco regardless of the form of tobacco, constituting more than half of the proportion (53.4% to 57.04%) of total current tobacco users across the different tobacco forms.

Associations between susceptibility of tobacco using and several predictors among never tobacco users

Table 3 compares the two subcategories

Table 1- Descriptive Characteristics Of The Survey Participants According To Their Tobacco Usage

Variable		All N	All WN	All %±SE	Never Tobacco user N	Never Tobacco user WN	Never Tobacco user %±SE	Former Tobacco user N	Former Tobacco user WN	Former Tobacco user %±SE	Current Tobacco user N	Current Tobacco user WN	Current Tobacco user %±SE	P Value
Age	11-13	4,185	14,439,614	40.31±2.3	3269	10,988,559	39.85±2.2	363	1,339,826	40.06±3.36	550	2,106,190	43.43±4.13	<.0001*
	14-15	6,890	19,557,611	54.6±2.2	5449	15,239,513	55.28±2.12	617	1,813,568	54.22±3.17	819	2,492,121	51.39±4.03	
	≥16	572	1,418,942	3.96±0.3	441	1,073,645	3.89±0.4	54	142,589	4.26±0.73	77	202,707	4.18±0.73	
Gender	Male	5,686	20,377,936	56.89±2.4	4210	14,811,697	53.73±2.52	574	2,193,221	65.58±3.34	897	3,361,008	69.31±2.59	<.0001*
	Female	5,890	14,751,605	41.18±2.42	4914	12,322,595	44.7±2.55	436	1,020,215	30.5±3.15	536	1,398,152	28.83±2.55	
Grade	8th	3,839	13,846,039	38.65±2.83	3001	10,614,848	38.5±2.8	329	1,245,501	37.24±3.8	508	1,984,476	40.92±4.4	<.0001*
	9th	3,870	11,491,266	32.08±2.7	3149	9,118,475	33.08±2.8	318	1,001,906	29.95±3.7	401	1,363,437	28.11±3.6	
	10th	3,904	9,967,958	27.82±2.1	2981	7,484,307	27.15±2.1	378	1,009,481	30.18±3.6	538	1,457,938	30.06±3.3	
Total		11,768	35,819,044	100	9240	27,564,102	76.95±1.07	1049	3,344,338	9.33±0.57	1462	4,849,239	13.53±0.67	-

N,sample size; WN, weighted sample; SE,Standard error

Table 2. Current Tobacco Users By The Form Of Tobacco

Variable		Cigarette or Bidi			Chewable/Smokeless			Polytobacco use			
		N	WN	%±SE	N	WN	%±SE	N	WN	%±SE	P-value
Age	11-13	185	694,957	39.7±5.3	259	956,708	44.8±4.3	111	421,516	39.1±7.2	0.08
	14-15	312	997,063	57.09±5.4	401	1,149,487	53.3±4.2	200	1,641,524	54.3±6.4	
	≥16	18	54,445	3.11±0.85	15	29,095	1.3±0.47	26	69,909	6.49±2.06	
Gender	Male	368	1,405,211	80.9±2.7	365	1,473,711	69.7±3.5	220	788,303	75.2±3.8	0.016
	Female	144	329,866	19.1±2.7	304	640,067	30.2±3.5	109	259,145	24.7±3.8	
Grade	8th	170	640,448	37.1±5.7	214	817,293	38.4±4.9	106	398,612	37.6±7.4	0.791
	9th	132	487,123	28.1±4.6	218	680,597	32±4.8	96	296,307	27.9±5.8	
	10th	208	597,077	34.7±5.3	240	628,609	29.5±4	131	364,536	34.4±6.3	
Total		510	1,724,649	35.1±2.1	672	2,126,500	43.3±2.1	333	1,059,455	21.5±2.6	

N, sample size; WN, weighted sample; SE, Standard error

Table 3. Never Smoker according to Their Susceptibility of Smoking in the Next One Year

Variable		Low susceptibility			High susceptibility			P value
N millions		N	WN	%±SE	N	WN	%±SE	
Age	11-13	3,033	10,363,829	39.8±2.3	558	1,828,085	42.5±3.1	0.604
	14-15	5,118	14,354,038	55.2±2.1	824	2,316,792	53.8±3.04	
	≥16	426	1,022,749	3.9±0.4	49	130,320	3.02±0.6	
Gender	Male	3,937	13,927,637	53.5±2.5	745	2,739,404	63.6±3.0	<0.0001
	Female	4,607	11,653,844	44.8±2.6	674	1,495,423	34.75±3.2	
Grade	8th	2,827	10,054,656	38.6±2.8	438	1,629,348	37.8±3.7	0.7292
	9th	2,934	8,584,596	33.05±2.8	483	1,338,274	31.2±3.3	
	10th	2,791	7,028,272	27.1±2.1	503	1,276,696	29.7±3.4	
Total		8,656	25,995,412	80.38±1.1	1440	4,302,138	19.61±1.1	

N, sample size; WN, weighted sample; SE, Standard error

of never-smokers, i.e. low susceptibility and high susceptibility. The two subcategories are based on their attitude towards future smoking behavior. Never smokers thereby were classified as "high susceptibility" never smokers constituting 19.61% and "low susceptibility" constituting 80.38% of the total sample. Within each subgroup of age and grade, low susceptibility subjects were more in number than high susceptibility subjects. Smoking and tobacco use are more prevalent amongst males compared to females. Among never smokers, more

males have higher susceptibility for smoking in near future (63.6% vs 34.75%).

Associations between the educational program/ Professional advice and the possibility of quitting among ever tobacco users

Table 4 displays the results of reception of professional advice to quit smoking among ever smoker. Of the total 289 ever smokers who received professional / program advice, 143 (49.23%) have quit smoking and 146 (50.77%) of the subjects are still smoking. Among those who got

Table 4. Distribution and Adjusted Odds of Receipt of Professional/ Program Advice and Quitting of Smoking among the Youth

Variable		Yes quit smoking			No did not smoking			
		N	WN	%±SE	N	WN	%±SE	OR 95% CI
Advice		143	442,266	49.23±4.1	146	456,148	50.77±4.1	5.30 (3.3-8.6)*
Age	11-13	52	164,569	37.2±5.4	45	162,512	35.6±6.9	1
	14-15	87	265,647	60.06±5.6	84	257,178	56.38±6.7	0.83 (0.45-1.5)
	≥16	2	7,631	1.7±1.21	14	28,395	6.22±2.3	1.5 (0.65-3.5)
Gender	Male	99	337,409	76.3±4.7	100	325,560	71.3±6.6	1
	Female	41	95,645	21.62±4.7	44	127,262	27.9±6.6	0.81 (0.47-14)
Grade	8th	41	128,987	29.16±6.3	45	169,913	37.2±7.3	1
	9th	35	127,165	28.7±6.03	31	99,234	21.75±5.7	1.41 (0.64-3.11)
	10th	64	180,421	40.79±6.6	68	184,184	40.37±6.5	1.23 (0.57-2.66)
Parents smoke		142	43,378	20.28±2.6	521	1,704,408	79.7±2.7	0.57 (0.31-1.02)

N, sample size; WN, weighted sample; SE, Standard error; *p value <0.05

advice and have quit smoking 76% are males and 29% are females. Logistic regression analysis shows, that the reception of professional counselling by a professional or a program for tobacco cessation was associated with high odds ratio of quitting (adjusted OR= 5.3; 95% CI-3.3- 8.6). Students whose parents were smokers, were less likely to quit smoking even after receiving professional advice (adjusted OR=0.57). Students of age 16 years and higher, 9th graders and males showed higher odds of quitting.

Discussion

Smoking and chewing tobacco has severe health, economic and social impacts. Tobacco use exposes, both the first hand users and second hand smokers, to many potentially carcinogenic chemicals and diseases (Potera, 2011; Salem et al., 2013). Tobacco users spend about 5% to 15% of the disposable income on tobacco. Monetary spending on tobacco products along with the medical and dental expenditures causes a significant economic burden on the individual and their families (Oh et al., 2012). Socially, tobacco users may face discrimination effecting their social and personal relationships negatively.

In this study, we analyzed a nationally representative sample of the school-going teenagers in India for smoking status and professional advice. Majority of the high school students in India have never used tobacco (76.95%). When considering smoking, about 85% of our sample is never smokers and 15% have ever tried smoking bidi or cigarette. Among all the high school children, just 1 in every 5 children got advice to quit smoking by a professional or a program. Female smokers get less smoking cessation advice when compared to males. This was even less among the female former smokers.

Study conducted in Mumbai city, showed about 5.6% use tobacco and 18% have used areca nut products (Rose et al., 2016). A study conducted in rural population using the GYTS survey showed any form of tobacco use prevalence of 12.6% (Boys: 23.7%; Girls: 4.7%) and smokeless tobacco form among 6.6% (Baghel et al., 2015). Another study conducted in urban north India found 12% as prevalence of tobacco use and 70 per cent of boys and 80 per cent of girls initiated tobacco use before the age of 11 years (Narain et al., 2011). In our study, younger subjects have high proportion of tobacco users, this may be due to lack of knowledge and awareness of tobacco harm among the young (Goyal, 2016; Rose et al., 2016). Study among 9 different west African nations showed a prevalence of ever smokers range from 5% to 25% (Veeranki et al., 2017). Significant correlates for smoking were identified as being male, exposures to parental or friend smoking, and promotions (Veeranki et al., 2017).

Reception of professional advice for smoking cessation showed a higher odds of quitting (adjusted OR= 5.3, p<0.0001) compared to those who did not receive any professional advice. From the total number of ever smokers (n=1,610, current plus former smokers), only 17.9% (n=289) have received program or professional advice to quit smoking. Smoking by females in India is a social taboo and in our study, a female showed less odds of quitting smoking when compared to male, but was not

statistically significant. Possible reasons as why females had lesser odds may be due to the (1) higher prevalence of smokeless form of tobacco use among females than smoked form and (2) the females who are addicted and smoke a lot may have got the advice to quit. As smoking is a social taboo, female students may be afraid to reveal their smoking habits to their family, physician, or healthcare workers. Hence, professional advice may have been given to the females who are not occasional smokers or to those who have bespoke their smoking habits. The patients who are addicted and smoke more are more difficult to manage and hence may show lower odds of quitting.

The number of students who got cessation advice increased as the age increased, except the age group of 16 years and older. This can be because there were less number of students in the 16 years and older age group. The effect of society and environment influences on children cannot be underestimated. Indian society is traditionally a very close-knit community, especially in rural parts, which houses majority of the Indian population, friends and family shape the child's environment and habits. With at least one family member smoking, the odds of quitting smoking decreased to almost half.

Other studies conducted have shown the effectiveness of tobacco cessation advice by physician, dentist, or any professional counselor to be effective (Gervais et al.; Lai et al., 2010; Schauer et al., 2014; Collins et al., 2017). Healthcare provider advice for tobacco cessation, from 2000 and 2011 in the US, has shown increased quit attempts among smokers (Lai et al., 2010; Schauer et al., 2014). Physician advice to quit smoking resulted in higher odds (OR=1.4) of quit attempts among current smokers compared to those who did not receive any such advice.

Systematic review of Randomized Controlled Trials of Youth Smoking Cessation Interventions has shown increased efficacy for smoking cessation by healthcare providers (Gervais et al.). Meta-analysis study for motivational interviewing for smoking cessation also concluded the importance of physician or healthcare worker advice. Physician advice along with motivational interviewing resulted in higher rates of cessation among the recipients compared to those who did not (Lai et al., 2010) . A national level study among youth in the US, found physician who assess for tobacco use had higher odds of giving of tobacco cessation advice to their patients (Collins et al., 2017). Health workers play an important role in tobacco control. Guides such as the national tobacco control guide for health workers should be utilized in training health workers, which have shown to very effective in training (Goel et al., 2015).

The landmark 2003 COTP Act prohibits the sale of tobacco products to minors and smoking in public places. Though introduced in 2003, the implementation of smoke-free public places act was amended in 2009. Compulsory ID check, prohibition of sale of loose cigarettes are not implemented properly (Selvavinayagam, 2010; Kaur and Jain, 2011). The Government of India has provided guidelines for tobacco-free educational institutions, which include implementation of health education programs to abstain from tobacco and alcohol, smoke free campus and the setup of "tobacco control committee" within

each school. Though passed as a law a 15 years ago, the practical implementation of the law faces stiff challenges, especially due to the lack of manpower to implement it (Kaur and Jain, 2011; Goel et al., 2014; Turner et al., 2016).

Using this survey, we were not able to find out if the professional advice was given in the school or at a physician's office or some other health program. Which would further enable us to see the effectiveness of the source of the advice. The study being a cross-sectional study and due to the construct of the questions, we were not able to establish temporal relationship between the advice and successful quitting; hence, we cannot show the causal relation between them. We cannot establish the number and the intensity of advices a subject has received. GYTS is a school based survey, hence can only be generalized to the school going youth population. The survey being self-reported, some students, especially female students, might have not reported their tobacco habits underestimating the tobacco use prevalence. Moreover, occasional smokers or some days' smokers were not captured in this survey. The use of smokeless tobacco is more prevalent in India. We were not able to define former tobacco users due to the limitation in the survey questionnaire in regards to last usage of smokeless tobacco products. The question of reception of professional advice to quit in GYTS 2009 only covers smoking. Hence, we could not evaluate the effectiveness of professional advice on other tobacco forms. It will be more valuable to include smokeless tobacco in this measurement for India population due to significant use of smokeless tobacco.

In conclusion, the overall prevalence of tobacco use among high school going children in India has been in decline since 2003. Indian children, smokeless tobacco has higher prevalence than cigarettes and bidis. An emphasis on complete abstinence from tobacco products must be delivered to them. Professional advice from physicians, dentists, and other health professionals, school health program educators and NGO's has proved to be very effective in smoking cessation (OR=5.3). The government and these professional programs must intensify their efforts in propagating smoking cessation message among the youth.

Conflict of interest

The authors have stated explicitly that there are no conflicts of interest in connection with this article.

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