



# Prevalence of Obesity in Primary School Students and its Relation to Watching TV in Arar City

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## ABSTRACT

The prevalence of obesity and overweight in children has risen in both males and females. To investigate the prevalence of overweight and obesity among female primary school students (7-12years old) in Arar city, 2018, and explore its association with watching television. A cross-sectional study was conducted, including 330 girls, using the multistage cluster sampling technique. Parents completed a structured questionnaire about demographic characteristics and lifestyle factors (diet and physical activity). Every child's body weight and height were measured and plotted on Growth charts for female Saudi children. Data were collected during the first semester of 2018. The prevalence of overweight and obesity was 15.9%, 9.6% had a family history of obesity, about 91.7% of the students consume  $\leq 3$  meals but 8.3% consume  $> 3$  meals daily. 15% of them eat fast food in two and more of their daily meals. The daily time of video games was  $> 2$  hours in 37.6%. 32.8% were watching TV alone away from parents. Only 44.6% of girls practice physical exercise. There was significant relation ( $P < 0.05$ ) between obesity, fast food consumption, frequency of daily meals, watching TV alone away from parents, physical inactivity, daily time of video games, and family history of obesity. The prevalence of overweight and obesity among primary school girls was considerable. They have bad dietary habits and lack physical exercise. Family physicians counseling of parent on national education is recommended to educate girls on healthy lifestyle.

**Key Words:** Obesity, Prevalence, Children, Primary school, KSA

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## INTRODUCTION

Childhood obesity is a serious health problem internationally. World Health Organization (WHO) defines obesity as a condition of excessive body fat that exceeds healthy limits that risk health [1]. Overweight and obese children are expected to continue obesity into maturity and more probable to get non-communicable diseases like diabetes and cardiovascular problems at an earlier age [2, 3].

Identifying ecological effects that influence body weight in children is important for developing suitable protective strategies. One possible ecological issue is the extent of TV watched [4].

Childhood obesity is rising in Saudi Arabia with a distressing rate. In the prevalence of overweight and

obesity, risk factors included higher parental education, and lifestyle factors. lifestyle factors included increased consumption of calorie-dense food and a sedentary lifestyle [5].

The prevalence rate of childhood overweight and obesity continued to increase reaching 48.3% in males in 2018 and to 27.6% in females in 2017. Management of adolescents with obesity in Saudi Arabia is considered a public health priority [6, 7].

In a study in Alhsa, it was reported that the general prevalence of overweight and obesity among school children was 29.6% (10.8% overweight, 3.8% obese, and 15% extremely obese). The occurrence of overweight and obesity was considerably affected by maternal obesity, employment of the mother, income of the family, eating

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snacks and takeaway foods, bodily laziness, and period of time spent watching television [8].

In Taif city, Saudi Arabia, childhood overweight and obesity is a public health problem affecting more than one-third of girls and almost one-fifth of boys. It confirms the significant association between some unhealthy dietary habits and increases the prevalence of childhood obesity [9, 10].

Several studies reported that higher TV numbers of watching hours are related to increasing body mass index (BMI), decreased body fitness, and increased blood cholesterol levels [11, 12].

Three possible mechanisms have been projected to clarify the connection between TV watching and obesity; First, watching TV may lead to reduced physical activity, decreased energy expenditure comparative to energy consumption, and leads to obesity. Second, the mental immaturity of children rises their vulnerability to influential intent of advertisements for foods of deprived nutritious value. Food advertisements are broadcast frequently during children's television programs and prime to corrupt food favorites, and dietary inequities related to obesity. Third, action shift joint with vulnerability to convincing intent of televised food advertisements influences young children to early obesity [13, 14].

There is no information on the prevalence of obesity among female primary school children in the Northern Borders region, Saudi Arabia. This study aimed to determine the prevalence of overweight and obesity among female primary school students (7-12 years old)

## MATERIALS AND METHODS

A cross-sectional study was conducted on Saudi female Primary schools in Arar city

Sample size was calculated using StatCalc of Epi Info software version 7.222 using the following criteria; population size 3700 students, female expected frequency (prevalence of overweight and obesity was 12.4% So, the final sample size was 330 students.

Total number of primary schools in Arar city is 25 schools. Sampling was selected using the multi-stage cluster sample technique. In the first stage, 2 schools were selected randomly. In the second stage, one class from each grade was randomly selected. All children of each chosen class were included in the study.

Official permission was obtained from the educational authorities in Arar. A structured questionnaire was used to collect demographic characteristics and lifestyle factors (diet and physical activity) from parents. Pilot study was carried out on 30 students to test the questioner. No modification was required. The Questionnaire was given to the parents of the children to complete the data and to sign the consent. The questioner assessed the following

variables; age, gender, grade, number of siblings, height, weight, any chronic disease, physical activity, number of TVs in the home, number of hours watching TV per day, eating junk foods, eating breakfast before going to school, eating vegetables, and usually drink fresh juice.

The researcher visited the school 3 times per week during the period from 1<sup>st</sup> January to 31<sup>st</sup> May 2019. Anthropometric assessment was done for the children. The children were asked to stand on weigh scale with minimal clothing and without shoes. The weight was measured in kg to the nearest decimal fraction. The height was measured in meter using a suitable tap meter scale fixed on the wall, height of the subjects was measured without shoes taking into that heels, buttocks, shoulders, and head were closed to the vertical wall surface. Diagnosis of overweight was done BMI-for-age percentile  $>85^{th} \geq 95^{th}$ . Obesity was diagnosed by BMI-for-age percentile  $>95^{th}$  centile after plotting on age-specific growth charts for Saudi females [15]. For assessing the physical activity of children and adolescents, a physically active child should do a total of at least 60 min/day moderate-to-vigorous physical activity (MVPA) or vigorous physical activity in bouts of at least 10 min [16, 17].

Statistical analysis was performed using the statistical package for social sciences (SPSS version 20.0). Quantitative data were expressed as mean  $\pm$  SD & (range), and qualitative data were expressed as absolute frequencies (number) & relative frequencies (percentage). Percentage of categorical variables were compared using the Chi-square test or Fisher exact test when appropriate. P-value  $<0.05$  was considered statistically significant (S), and p-value  $\geq 0.05$  was considered statistically insignificant (NS).

## RESULTS AND DISCUSSION

According to Table 1, BMI distribution, 84.1% had normal BMI and 15.9% were overweight and/or obese (**Figure 1**). Family history of obesity was positive in 9.6% of them, 91.7% consumed  $\leq 3$  meals but 8.3% consumed  $>3$  meals daily and 15.3% ate fast food in 2 and more of their daily meals. A daily time of video games was  $>2$  hours in 37.6% (**Figure 2**), 32.8% were watching TV alone away from parents (**Figure 3**) and physical exercise was performed by 44.6% of participants. There was a significant relationship ( $P<0.05$ ) between the BMI of study children, family history of obesity, fast food consumption. However, no significant relationship was observed between the BMI of study children and their daily meals, watching TV alone away from parents, physical exercise, and daily time of video games.

**Table 2** shows the relationship between BMI and the study group's socio-demographic characteristics. There was a significant relationship between the BMI and fathers' education ( $P<0.05$ ), while there was no significant

relationship between the BMI and other socio-demographic characteristics.

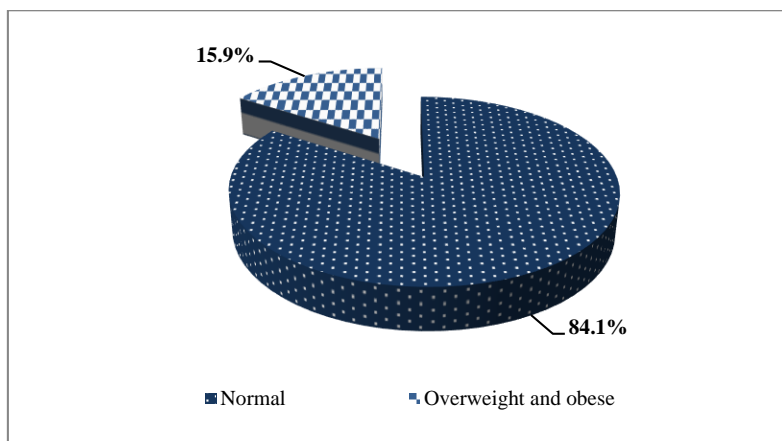
**Table 3** shows the relationship between the BMI of the study group and their dietary history and family history of obesity. There was a significant relationship between the BMI and family history of obesity, fast food consumption, and the number of daily meals ( $P < 0.05$ ).

**Table 4** shows the relationship between BMI of the study group and watching TV and physical exercise. Our study found that there was a significant relationship between the BMI and watching TV alone away from parents, physical exercise, and daily time of video games ( $P < 0.05$ ).

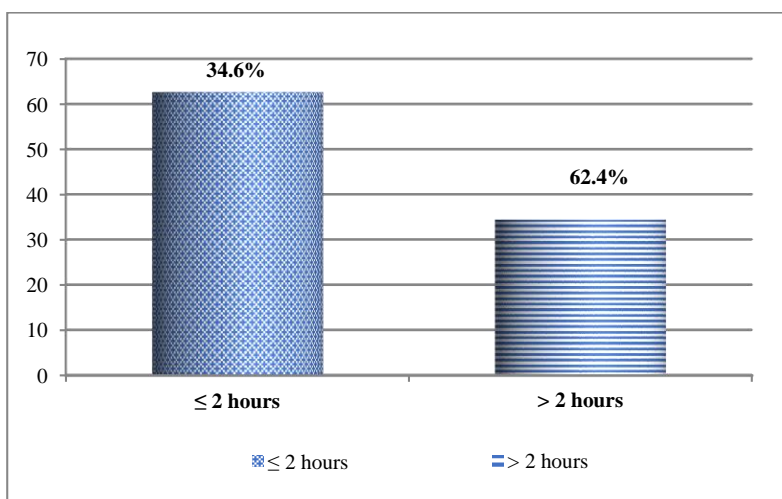
**Table 1.** Socio-demographic characteristics, BMI, dilatory history, family history of obesity, watching TV, and physical exercise in the study group

| Variables                 | Responses                            | No. (%)           |
|---------------------------|--------------------------------------|-------------------|
| Age                       | Mean( $\pm$ SD)                      | 10.2( $\pm$ 1.36) |
|                           | Range                                | 7-13              |
| Nationality               | Saudi                                | 241(76.0)         |
|                           | Non-Saudi                            | 73(23.2)          |
| Fathers' education        | Less than secondary school education | 27(8.6)           |
|                           | Secondary school education and above | 287(91.4)         |
| Mothers education         | Less than secondary school education | 39(12.4)          |
|                           | Secondary school education and above | 275(87.6)         |
| Fathers work              | Unemployed                           | 25(8.5)           |
|                           | Government's employee                | 196(66.4)         |
|                           | Private sector employee              | 74(25.1)          |
| Working mother            | Housewife                            | 115(37.0)         |
|                           | Employed                             | 196(63.0)         |
| Child order               | 1-2                                  | 168(53.5)         |
|                           | 3-4                                  | 94(29.9)          |
|                           | $\geq 5$                             | 52(16.6)          |
| Child grade in the school | 1 <sup>st</sup>                      | 30(9.01)          |
|                           | 2 <sup>nd</sup>                      | 36(10.9)          |
|                           | 3 <sup>rd</sup>                      | 80(24.2)          |
|                           | 4 <sup>th</sup>                      | 107(32.4)         |
|                           | 5 <sup>th</sup>                      | 77(23.3)          |
|                           |                                      |                   |
| Family income             | Insufficient                         | 30(9.6)           |
|                           | Satisfactory                         | 138(43.9)         |
|                           | More than satisfactory               | 146(46.5)         |
| Family history            | Yes                                  | 29(9.2)           |
|                           | No                                   | 285(90.8)         |
| BMI distribution          | Normal                               | 264(84.1)         |
|                           | Overweight and obese                 | 50(15.9)          |
| Fast food                 | Less than 2 meals                    | 266(84.7)         |
|                           | 2 and more                           | 48(15.3)          |
| Daily meals               | $\leq 3$ meals                       | 288(91.7)         |
|                           | $> 3$ meals                          | 26(8.3)           |
| TV number in the home     | $\leq 1$                             | 85(27.1)          |
|                           | $> 1$                                | 229(72.9)         |
| Daily time of video games | $\leq 2$ hours                       | 196 (62.4)        |
|                           | $> 2$ hours                          | 118(37.6)         |

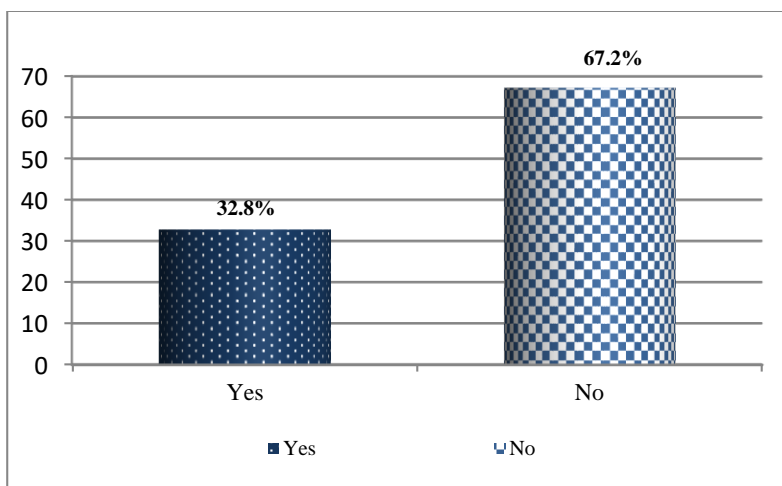
|                                     |     |           |
|-------------------------------------|-----|-----------|
| Physical exercise                   | Yes | 140(44.6) |
|                                     | No  | 174(55.4) |
| Watching TV alone away from parents | Yes | 103(32.8) |
|                                     | No  | 211(67.2) |



**Figure 1.** Percentage distribution of the study Children by BMI in Arar, 2019



**Figure 2.** Daily time of video games spent by children, Arar, 2019



**Figure 3.** Watching T.V alone away from parents, Arar, 2019

**Table 2.** Relationship between BMI and socio-demographic characteristics of the study group

| Variables          | Responses                            | BMI                               |                               | Total (N=314) | P value |
|--------------------|--------------------------------------|-----------------------------------|-------------------------------|---------------|---------|
|                    |                                      | No overweight and obesity (n=264) | Overweight and obesity (n=50) |               |         |
| Nationality        | Saudi                                | 206(78.0)                         | 35(70.0)                      | 241(76.0)     | 0.2     |
|                    | Non-Saudi                            | 58(22.0)                          | 15(30.0)                      | 73(23.2)      |         |
| Fathers' education | Less than secondary school education | 27(10.2)                          | 0(0.0)                        | 27(8.6)       | 0.012   |
|                    | secondary school education and above | 237(89.8)                         | 50(100)                       | 287(91.4)     |         |
| Mothers education  | Less than secondary school education | 33(12.5)                          | 6(12.0)                       | 39(12.4)      | 0.9     |
|                    | secondary school education and above | 231(87.5)                         | 44(88.0)                      | 275(87.6)     |         |
| Fathers work       | Unemployed                           | 24(9.6)                           | 1(2.2)                        | 25(8.5)       | 0.1     |
|                    | Government's employee                | 160(64.3)                         | 36(78.3)                      | 196(66.4)     |         |
|                    | Private sector employee              | 65(26.1)                          | 9(19.6)                       | 74(25.1)      |         |
| Working mother     | Housewife                            | 93(35.6)                          | 22(44.0)                      | 115(37.0)     | 0.26    |
|                    | Employed                             | 168(64.4)                         | 28(56.0)                      | 196(63.0)     |         |
| Child order        | 1-2                                  | 136(51.5)                         | 32(64.0)                      | 168(53.5)     | 0.14    |
|                    | 3-4                                  | 80(30.3)                          | 14(28.0)                      | 94(29.9)      |         |
|                    | ≥5                                   | 48(18.2)                          | 4(8.0)                        | 52(16.6)      |         |
| Family income      | Not sufficient                       | 25(9.5)                           | 5(10.0)                       | 30(9.6)       | 0.9     |
|                    | Satisfactory                         | 117(44.3)                         | 21(42.0)                      | 138(43.9)     |         |
|                    | More than satisfactory               | 122(46.2)                         | 24(48.0)                      | 146(46.5)     |         |

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**Table 3.** Relationship between BMI of the study group and their dietary history and family history of obesity

| Variables                 | Responses         | BMI                               |                               | Total (N=314) | P-value |
|---------------------------|-------------------|-----------------------------------|-------------------------------|---------------|---------|
|                           |                   | No overweight and obesity (n=264) | Overweight and obesity (n=50) |               |         |
| Fast food                 | Less than 2 meals | 229(86.7)                         | 37(74.0)                      | 266(84.7)     | 0.02    |
|                           | 2 and more        | 35(13.3)                          | 13(26.0)                      | 48(15.3)      |         |
| Daily meals               | ≤3 meals          | 246(93.2)                         | 42(84.0)                      | 288(91.7)     | 0.046   |
|                           | > 3 meals         | 18(6.8)                           | 8(16.0)                       | 26(8.3)       |         |
| Family history of obesity | Yes               | 17(6.4)                           | 12(24.0)                      | 29(9.2)       | 0.000   |
|                           | No                | 247(93.6)                         | 38(76.0)                      | 285(90.8)     |         |

**Table 4.** Relationship between BMI of the study group and watching TV and physical exercise

| Variables                           | Responses | BMI                               |                               | Total (N=314) | P-value |
|-------------------------------------|-----------|-----------------------------------|-------------------------------|---------------|---------|
|                                     |           | No overweight and obesity (n=264) | Overweight and obesity (n=50) |               |         |
| TV number in the home               | ≤ 1       | 76(28.8)                          | 9(18.0)                       | 85(27.1)      | 0.1     |
|                                     | > 1       | 188(71.2)                         | 41(82.0)                      | 229(72.9)     |         |
| Daily time of video games           | ≤ 2 hours | 171(64.8)                         | 25(50.0)                      | 196 (62.4)    | 0.048   |
|                                     | > 2 hours | 93 (35.2)                         | 25(50.0)                      | 118(37.6)     |         |
| Watching TV alone away from parents | Yes       | 79(29.9)                          | 24(48.0)                      | 103(32.8)     | 0.01    |
|                                     | No        | 185(70.1)                         | 26(52.0)                      | 211(67.2)     |         |



|                   |     |           |          |           |      |
|-------------------|-----|-----------|----------|-----------|------|
| Physical exercise | Yes | 125(47.3) | 15(30.0) | 140(44.6) | 0.02 |
|                   | No  | 139(52.7) | 35(70.0) | 174(55.4) |      |

The present cross-sectional study was conducted among 330 female students in the primary school in Arar, KSA. The study aimed to determine the prevalence of obesity among female primary school students (6-12 years old) in Arar city, Northern Saudi Arabia, during the academic year of 2018-2019 and explore its association with watching television.

As regards the percentage distribution of the study children by BMI, the present study found that 15.9% of female students were overweight and obese. In Taif, KSA, in schoolboys, the prevalence of overweight and obesity were 10.7% and 7.6%, respectively; while in girls, they were 16.8% and 18.2%, respectively [9]. In Jazan, overweight and obesity were 10.1% and 12.4%, respectively, and both obesity and overweight were more frequent in children consuming more fast food [17].

Aljaadi and Alharbi stated that the frequency of obesity in Saudi children is increasing and is associated with psychosomatic and societal consequences. It differs according to gender, area of residence, and description of cases [18].

As regards the association of the BMI of the study group with watching TV and physical exercise, our study reported a significant association between the BMI and watching TV alone away from parents, physical exercise, and daily time of video games ( $P < 0.05$ ).

Similar to our results another study reported that there were significant correlations between the prevalence of obesity and physical exercise and watching TV ( $P < 0.050$ ) and the findings showed that performing any type of sport as biking, swimming, or football frequently is considerably associated with less prevalence of overweight and obesity ( $P < 0.001$ ) [19]. Also, another study found that there was a significant relationship between BMI, and physical exercise and computer games but no significant relationship was observed with watching TV [20]. In contrast to our results, another study found that there was no significant association between obesity and time spent watching TV and using the computer or playing video games [21].

Also, a systematic review that included a total of 66 analyses of data on the relationship between TV watching and obesity found that 47 studies stated a positive association, while 19 studies stated no relationship, and no studies reported an inverse association between watching TV and obesity. It was stated that watching TV reduced resting metabolic rate while it was not supported by other studies. The results of the studies that observed the link between TV watching and physical activity were unreliable. Of the 34 studies recognized, two stated a

confident association, 16 found no association, 15 concluded there was an inverse association, and one had mixed results. The national Children's Nutrition Survey is among the studies that reported an association between watching TV and a less nutritious dietary intake [22].

On the other hand, Katzmarzyk *et al.* (1998) reported a positive association ( $P < 0.05$ ) between the time of watching TV and obesity in boys aged 9-12 years, but not in any other gender-age subgroups [23]. Also, TV viewing was positively associated with BMI and skinfold thickness in both genders, although it was significant only for BMI in boys ( $P < 0.05$ ) as reported by Guillaume *et al.* (1997) [24]. This is in line with Ozdirenc *et al.* (2005) who reported a significant positive correlation between BMI and the amount of watching TV ( $P < 0.05$ ) [25]. Again, time per day spent watching TV was positively associated with having a BMI above the 50th percentile ( $P = 0.001$ ) as reported in a cohort by Maffei *et al.* (1998) [26]. In addition, Grund *et al.* (2001) reported that children who watched TV  $> 1$  hr/day had a higher BMI (22.0 vs 19.8) and fat mass (30.7% vs 24.5%) than those who watched less while children watching TV  $> 3$  hours/day had about 40% increased prevalence of obesity compared with children watching  $< 1$  hour/day as reported by Guan-Sheng *et al.* (2002) [27, 28]. Findings are consistent with Scragg *et al.* (2004) who reported children watching TV  $> 2$  hours per day had higher BMI than those watching  $< 1$  hour per day (19.3 vs 18.7 kg/m<sup>2</sup>;  $P = 0.005$ ) [29].

Regarding overweight and obesity risk factors, the current study concluded that an unhealthy diet and sedentary life were significantly associated with increased BMI. These findings were similar to previous studies. A study in Riyadh on expatriate girls found that 34.2% were insufficiently active [30]. Burke *et al.* (2005) in a cohort study reported that the mean BMI increased by 0.185 units for each extra hour/day of watching TV [31].

As regards the relationship between BMI of the study group with their dietary history and family history of obesity, we found that there was a significant relationship between the BMI and family history of obesity, fast food consumption, and number of daily meals ( $P < 0.05$ ).

In a study on dietary habits of Saudi children, one-quarter of children recorded eating sweets daily, and  $> 50\%$  recorded eating sweets irregularly, 56.3% of children reported drinking carbonated beverages occasionally and 17.1% drank it daily. Energy drinks weekly were found in 21.9% and daily drinking was found in 4.3% [32]. Another study stated a strongly positive correlation between child BMI and parents' BMI ( $P < 0.001$ ). It is possibly caused by hereditary factors or lifestyle issues [19].

Numerous studies agreed with these findings. Mo-suwan *et al.* (2000) reported that the hazard of child obesity was augmented 2-3 times by a positive family history of obesity. However, Al-Enazy *et al.* (2014) found no substantial association between the occurrence of obesity and the history of paternal obesity.

## CONCLUSION

The prevalence of overweight and obesity among primary school girls was considerable (15.9%). Family history, fast food consumption, watching TV alone away from parents, physical exercise, and daily time of video games were significant risk factors. So we recommend nutrition education for school girls and their parents.

### Study limitations

This was a cross-sectional study, which reflects the current situation only but cannot allow studying the causal relationship, which needs a follow-up study. Also, there were no detailed investigations of other causes as the genetic, dietary pattern from birth to now, and history of chronic diseases causing weight gain.

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**Conflict of interest:** None

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**Ethics statement:** Written & Oral informed consent was obtained from all individual participants included in the study. Additional informed consent was obtained from all individual participants for whom identifying information is included in this manuscript.

The study was approved by research ethical local committees of General Health Affairs of Northern Border region with researcher No. (0559748194), committee No. (H-09-A-51), and approval No. (1440/7).

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