Rate of obesity, body height, body weight and cardiorespiratory performance of 10-12 years old obese school-boys: Hungarian-Egyptian-Syrian descriptive-comparative study

معدل السمنة، طول الجسم ووزنه وأداء القلب والجهاز التنفسي لدى الأطفال الذين يعانون من السمنة المفرطة وتتراوح أعمارهم بين 10 و 12 سنة: دراسة وصفية مقارنة بين المجر ومصر وسوريا

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Receipt date : 21/08/2022 Acceptance date: 18/09/2022 Publication date: 31/12/2022

Abstract:

The aim was to explore and compare the obesity rate, body weight, body height and running performance among 10-12 years old obese boys' in three countries, Egypt, Hungary and Syria. Sample consisted of 418 obese, 10-12 years old. Body fat content was estimated according to Parizkova's suggestion. The cardiorespiratory performance was represented by 1200 m. Hungarians were significantly taller in 10- and 11 years old boys. The cardiorespiratory performance showed progressive improvement with age, but Hungarian's performance was significantly better.

Key words: Obesity; cardiorespiratory performance; Hungary; Egypt; Syria.

الملخص:

يهدف البحث إلى استكشاف ومقارنة معدل السمنة ووزن الجسم وطول الجسم وأداء الجري للأطفال البدينين من سن 10-12 سنة، مصر والمجر وسوريا. تشتمل عينة البحث على 418 طفل بدين من سن 10-12 سنة. تم تقدير محتوى الدهون في الجسم وفقًا لاقتراح باريزكوفا. تم قياس الأداء القلبي التنفسي بتطبيق اختبار 1200 م جري. كان المجريون أطول بشكل ملحوظ في سن 10 و 11 سنة. أظهر

الأداء القلبي التنفسي تحسنًا تدريجيًا مع تقدم العمر، لكن كان أداء الأطفال المجريين أفضل بشكل ملحوظ.

الكلمات المفتاحية: بدانة؛ الأداء القلبي التنفسي؛ المجر؛ مصر؛ سوريا.

Introduction:

In contrary with western countries research's situations and circumstances, many multifaceted limitations and restrictions may occur throughout the research processes in eastern regions of the world. Particularly when these researches are related to human beings with exceptional emphasis on children. Consequently, most of researchers, especially in medical and health areas, prefer to use simple methods and instruments which are not conflict-provocative constructing, and are compatible with the local traditions and rules.(Mahmoud, 2001) Anthropometric measures are one of these methods which are preferable and most frequently obtainable in health-related researches and in assessing human body composition, especially in developing countries.(Ball, Altena, Swan, 2004) Furthermore, body weight, body height and skinfold thicknesses are commonly applied prognosticators of body composition and related health and pathologic issues, and have acquired distinctive attention in children's obesity assessment. On the other hand, skinfold thicknesses and its estimates of body fat content are a criticism subject for many researchers. The criticism is concentrated on the result of the estimated variable, concretely, the characteristics of the sample(s) from which the methods and equations are derived and their validity confidence for other samples (Walker, Gaskin, Powell, Bennett 2002, Burton, Cameron, 2009). Despite the fact that, comparative studies of body composition and motor performance of children descending from diverse ethnic groups, are not often made. There is, however, growing apprehensions regarding childhood obesity and its impacts on children’s functional capacity, physical performance and health status. In parallel with these concerns, the alarming, progressive childhood

obesity rate and overweight in children and adolescents are rapidly intensifying to appalling epidemic magnitudes globally (Reilly et al. 2010. WHO, 2010). The increasing tendency is actually valid for most portions of the world irrespective of race, age, gender, geographic- or demographic-, and socioeconomic status for a certain region. For instance, rising obesity rate is will-documented in children in USA (Ogden, Carroll, Kit, Flegal, 2012), Australian (Booth et al. 2002) Swedish, Canadians, Danish, Spanish, Japanese, Koreans, Malaysians (NCDrfc, 2017), China (Shu-Rong, Yan, Min, Ying-Xiu, 2018), Bahrainis, Saudi Arabians, Egyptians, UAEs, Qataris, Jordanians (Musaiger, 2012), Syrians (Labban, 2014. Mahfouz, Hussam, 2016), and additionally in some African countries (Guthold et al. 2011. Truter, Penaar, 2012).

This indicates the comprehensively emergence research of obesity and it's impacts on physical performance of children, predominantly, when the extensive documentations, reveal the strongly negative relationship between obesity and physical fitness with further accentuation on cardiovascular performance (Church, Earnest, Skinner, Blair, 2007) and the level of physical activity, health status (WHO, 2018). Furthermore, related literature discloses the facts that obese children have sedentary life style and they are less participated in group physical activity or in actions (movements) which requires physical exertions, than their healthy weight counterparts (Mahmoud, 2011. Shu-Rong et al. 2018). This, with understanding that physical inactivity is also prevalent in healthy, non-obese children worldwide (WHO, 2018). Generally, the all-inclusive child's population, and in our case, obese children compensate their physical inactivity by replacing it with prolonged sitting-related activities (video games, computer concerns) which may lead to many chronic health problems and which associated with increased risk of premature death in adulthood (Van Uffelen et al. 2010. Thorp, Owen, Neuhaus, Dunstan, 2011). Nonetheless, overweight, obesity and physical inactivity

regarding children (also adult) in some Mediterranean countries such as Syria and Egypt had not been examined. as measure of periodic nationwide-health investigations, therefore, there is no nationally representative data. Consequently, body weight management and health related prescriptions and advices regarding obesity, motor performance enhancement and dietary issues are being given in consistence with non-indigenous, imported national representative samples results.

1. Objects

The aim of the present study was to: (1) explore the obesity rate, body weight, body height and, (2) describe the cardiorespiratory performance and (3) compare these variables among 10-12 years old obese boys' samples in three countries, Egypt, Hungary and Syria.

2. Materials and methods

The secondary data of the recent research was extracted from the original data which consisted of school boy's samples in three countries. The original samples contained a total of 1864 boys, 603 in Egypt, 650 in Hungary and 611 in Syria. The current research samples consisted of a total 418 obese school boys (F%≥22) aged 10-12 years. In Hungary (n=132), the boys were living and studying in Budapest and its conurbations, in Egypt (n=150) the boys were from several schools in Banha city and its countryside towns (northeast Egypt) and in Syria (n=136), they were from Daraa governorate (South Syria) and its municipalities. Table 1 demonstrates the subject's distribution in the three countries according to their age. In agreement with the respective paragraphs of Helsinki Declaration, all the investigated children and adolescents were apparently healthy, volunteer and no injuries or illnesses were recorded. Additionally, parents written consents were collected before the data collection. According to school's administration systems, all the children in the current research

from the three countries were actively participated in the physical education curricula's lessons, but not in the extracurricular physical or sport activities. Because of the sensitivity of the life period included in the present research, the originating of exact age groups was deliberated. Consequently, the children's calendar age was transformed into decimal system in where age-range was exactly one year in each age group, between 9.51,10.50 and 10.51,11.50 and 11.51,12.50 for ten, eleven and twelve years old boys respectively.

Table 1: Frequency distribution of the studied subjects

Decimal age	Egyptians		Hungarians		Syrians		Sum	
	N	%	N	%	N	%	N	%
9.51-10.50	44	10.53	32	7.66	41	9.81	117	27.99
10.51-11.50	52	12.44	46	11.00	44	10.53	142	33.97
11.51-12.50	54	12.92	54	12.92	51	12.20	159	38.04
Sum	150	35.89	132	31.58	136	32.54	418	100.00

Body weight was measured using calibrated electronic scale and the results were recorded to the nearest 100 g. Body height was measured by standardized stadiometer to the nearest 0.1 m and skinfold thicknesses (required for evaluating body fat content) in both sides of the body (biceps, triceps, subscapular, suprailiac and calf skinfolds) by Harpenden skinfold caliper. Relative body fat content (F%) was estimated according to the prescriptions of Parizkova, who stressed that the 22% relative body fat content reflect obesity status (Parizkova, 1961). Yet, the 1200 m running test was carried out in consistence with the athletic rules and results were recorded in seconds. Test was completed on dependability with the available

school's sets. The statistical analyses were completed using StatSoft Statistica software. After calculating means, standard deviations and percentages, one-way variance analysis (Anova) was carried out for the comparison of the three groups. Chi square was applied for the comparison of proportions and the student t-test was used to establish whether significant differences existed between group's means. The level of statistical significance was set at $p<0.05$.

3. Results

Table 2 expose the descriptive and comparative statistics of the percentages of the obese children from the whole, innovative samples in the three countries. The statistical analysis exposed that obesity rate for 10 years old boys was 29.73%, 20%, 26.97% for Egyptians, Hungarians and Syrians respectively. For 11 years old school boys, the percentage was 34.44%, 27.88% and 29.53% correspondingly. In twelve years old children the percentage for Egyptian was 35.53% and for Hungarian 33.73% and for Syrian 32.90%. The percentage for the entire country's sample (10-12 years old children) was 33.26% in Egypt and 26.88% in Hungary and 29.82% in Syria. According to related literature (Marie et al. 2014) the increasing tendency of obesity in a decade range is well documented worldwide. In the current research likewise, the results obtainable in table 2, the age reliant increasing tendency of obesity is an archetypal phenomenon in the three samples, despite that the studied age intervals are diminutive and confined to three years only (10-12 years). The age-to-age increasing rate varied between 1.9% in Egyptian 11 to 12 years and 5.85% in Hungarian 11 to 12 and 7% in Syrian 11 to 12 years old, but the most apparent rise was the Hungarian 10 to 11 years, where the percentage of obese boys had expanded by almost 8% (from 20 to 27.88%). Nonetheless, taking whole sample of a country (three age groups together) the obesity rates of the three nation were 33.26%, 26.88% and 29.82% for Egyptian, Hungarian and Syrian respectively.

Table 2: Frequency and percentages of obese school boys

Age	9.51-10.50		10.51-11.50		11.51-12.50		All	
Egyptian (Total)	148		151		152		451	
Egyptian (F%≥22)	N	%	N	%	N	%	N	%
	44	29.73	52	34.44	54	35.53	150	33.26
Hungarian (Total)	160		165		166		491	
Hungarian (F%≥22)	N	%	N	%	N	%	N	%
	32	20	46	27.88	56	33.73	134	26.88
Syrian (Total)	152		149		155		456	
Syrian (F%≥22)	N	%	N	%	N	%	N	%
	41	26.97	44	29.53	51	32.90	136	29.82

The means and standard deviations of body height and body weight are summarized in table 3. Body heights of Egyptian boys were 137.95, 143.22, 149.89 cm and body weights were 45.07, 52.15, 54.68 kg for 10, 11 and 12 years old boys respectively. For Hungarians, analogous values were 146.87, 149.59, 153.22 for body heights and 47.55-, 53.17, 56,72 kg for body weight. In Syrian sample, the comparable values were 142,67, 147.36, 152.43 cm and 44.99, 49.87, 52.49 kg for body height and body weight congruently.

The analysis of variance (ANOVA) displayed that there were significant differences in 10- and 11 years old boys body height, where Hungarians school boys were taller than their Syrian and Egyptian counterparts, but the differences in 12 years old boys were

non-significant. For body weight, there were no significant differences between age groups. However, in the three age groups for the same sample, body height and -regrettably- body weight alike showed significant increasing with age.

Table 3: Descriptive and comparative statistics for body height and body weight

Age	Egyptian		Hungarian		Syrian		p value
	Mean	SD	Mean	SD	Mean	SD	
H (10 yrs.)	137.95	8.88	146.87	6.25	142.67	6.91	0.0000*
H (11 yrs.)	143.22	7.41	149.59	6.75	147.36	6.78	0.0005*
H (12 yrs.)	149.89	7.81	153.22	7.88	152.43	8.02	0.0745
p value	0.000*		0.000*		0.000*		
W (10 yrs.)	45.07	8.90	47.55	7.79	44.99	7.11	0.6720
W (11 yrs.)	52.15	8.89	53.17	9.15	49.87	9.02	0.0177
W (12 yrs.)	54.68	7.94	56.72	8.66	52.49	8.19	0.4599
p value	0.000*		0.000*		0.000*		

H= height, W= weight, *indicate significant difference.

Table 4 epitomize the comparable results of 1200 m cardiorespiratory test. The statistical analysis divulges that the differences between the three sample were significant ($p<0.05$). Similarly, the cardiorespiratory test's results showed significantly progressive improvement with age. Nonetheless, the only exception was the result of 12 years old Egyptian children where the mean performance has deteriorated by nearly nine seconds. (from 451.27 in

11 years old children to 459.81 in 12 years old). The variability of standard deviations of Egyptian (86.56) and Syrian (74.24) age groups were considerably large, but in Hungarian groups (56.84) were moderate. Same tendency can be observed in the intragroup variability, 81.59, 91.26 for Egyptians and 66.25, 84.37 for Syrians and 52.83, 60.28 for Hungarians.

Table 4: Descriptive and comparative statistics for 1200 m test.

Age	Egyptian		Hungarian		Syrian		P value
	Mean	SD	Mean	SD	Mean	SD	
10 yrs.	575.09	91.26	405.89	57.41	566.04	84.37	0.000*
11 yrs.	451.27	86.73	397.93	60.28	433.82	66.25	0.002*
12 yrs.	459.81	81.59	379.36	52.83	416.49	72.11	0.000*
p value	0.000*		0.077		0.000*		

* indicate significant difference

4. Discussion and conclusion

4.1. Obesity rate

Our findings related to obesity rate of Egyptian and Syrian boys are analogous with those published by various researchers in different Arab countries. (Bin Zaal et al. 2011) have stated that the prevalence of obesity in the United Arab Emirates had the highest level at age 12,14 years, numerically 32.4% for 12 and 30.5% for 14 years old. Al-Mouzan et al. (2011) found the rate of obesity for children aged 10,12 years in Saudi Arabia 32.5% and for children aged 12,14 years 39.4%. Al-Mousa and Parkash (2000) discerned that 4.7% and 6.7% of male and female preschool children (0,5 years) were obese and the rate of

obesity increased to 8.1% and 8.8% for school children aged 6,9 years, and to 36.8% and 35.9% for children aged 10,13 years. Comparable propensity can be observed in Jordan (Abu-Zaiton, Al-Fawwaz, 2013) and Syria (Labban, 2014, Mahfouz & Hussam, 2016), However, Musaiger (2007) have evidently ascertained that commonly, the obesity rate in different Arab countries in school children aged 6,10 years is 12, 25% and in adolescents aged 11,18 years 25, 45% depending on methodology applied in the researches, geographic settlement and socioeconomic status of the samples. On the other side, equivalent findings can be distinguished in Hungarian school boys correspondingly. Frenkl and Mészáros (2002) confirmed that overweight and obesity in 9,14 years old Hungarian boys have protracted to 28, 30%. Similar results had been demonstrated by Ihász et al. (Ihász, Finn, Mészáros Zsidegh, 2006) and Farkas et al. (2003). Taking into consideration that Egyptians and Syrians are indigenous and descending from same genealogy (Arab), then no inquisitiveness that there were no significant differences between the rate of obesity between Egyptian and Syrian school boys (Chi square=0.389; p=0.5328). Since our sample is consisted of obese boys, the differences between Hungarian (European) and Arab Egyptian (Chi square=1.361; p=0.2434) and Arab Syrian (Chi square=0.302; p=0.5826) school boys were likewise non-significant, despite the higher obesity rate in Arab samples.

These comparable outcomes endorse the world health organization and other health related bodies in their reports and researches regarding childhood overweight and obesity, where some Arab countries and Hungary have frontward, noteworthy rank in the lists of furthermost overweight and obese nations (Marie et al. 2014).

4.2. Body weight and body height

Our results regarding body weight indicate that there were no significant differences between the three sample's age groups. (table

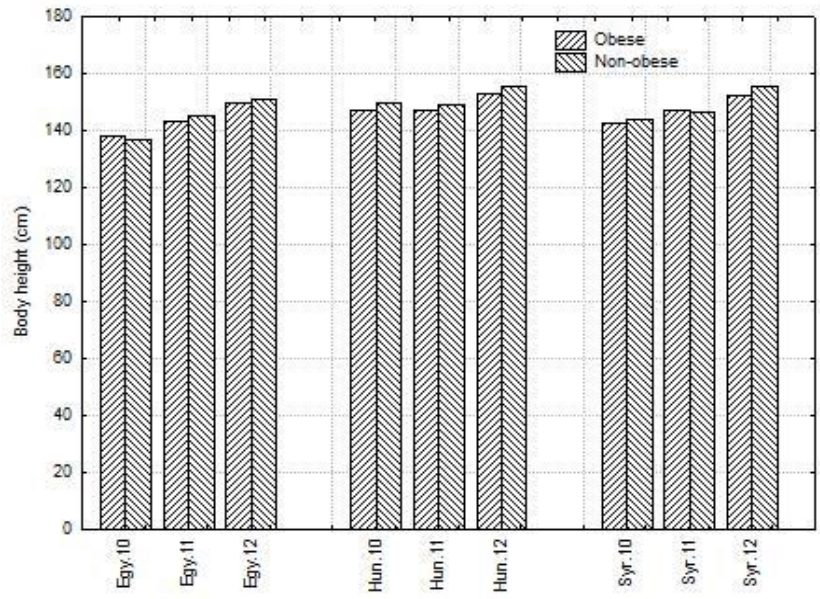
3). In contrary with body height, the none-significant differences in body weight may explained by the fact that the statistical analysis in the three countries restricted only to obese school boys (F%≥22%).

The results of the current research reveal that body height had significantly progressive tendency with age for the three groups in the three samples. Nonetheless, the differences in the progressive improvement of body height between the three samples maybe explained by the substantial differences in the day sunlight hours in three continents (Africa, Asia and Europe). Furthermore, Hungarian boys was significantly taller than their Egyptian, and moderately than their Syrian age-mates in the three age groups. According to previous researches (Mahmoud, 2001. El-Mouzan et al. 2011) the differences between the means are not just significant from a statistical but also from an anthropological viewpoint. The consistent mean differences are not considered to be random or sample dependent phenomenon, especially when the mean difference was close to 9 cm in ten years old boys for instance. In addition, alongside the significant differences between means, the remarkable results were the variability (standard deviations) in Egyptian and Syrian samples which were moderate but commonly larger than in Hungarians.

Our results are in consistence with previous research's findings regarding the height of young people in different Arab countries or ethnicities such as in Saudi Arabia (Al-Mouzan et al. 2011), in Emirates (Bin Zaal et al. 2011), in Bahrain (Al-Sendi, Shetty, Musaiger 2003), in Kuwait (Al-Mousa, Parkash 2000), in Egypt (Ali et al. 2020, Hussein et al. 2017) and for Arab ethnicity in Iran (Seyyed et al. 2012). Despite that most of previous researches had smaller samples, but there were no tangible significant differences between our research's results and their outcomes in mean body height. In one hand, by comparing body height results of the non-obese children in

our original sample with current research's sample, there were no significant differences between obese and non-obese boys (figure 1).

Figure 1: Comparison of body height between obese and non-obese schoolboys



In second hand, on basis of the analysis of mentioned researches, it is likely to endorse that the shorter body height (lower than Hungarians) is maybe a featured characteristic of young people living in Arab countries or descending from Arab ethnicity, but the generalization of this affirmation (shorter body height) needs further researches.

4.3. Cardiorespiratory performance

It is extensively well-documented that obesity is intensely associated with undesirable cardiorespiratory health status, with

origination of non-communicable diseases and with low motor performance with special consideration to aerobic endurance (Ceschia et al. 2016, Ortega, Ruiz, Castillo, 2013). However, our findings on the topic of 1200 m of 10 years old boys declared that Hungarians performed better than Egyptians (p=0.000) and Syrians(p=0.000) school boys, but no differences were found between Egyptians and Syrians (p=0.637). These results accentuated the deleterious differences between ethnic groups worldwide, and differentiated the effects of physical education (PE) lessons and curricula's philosophy on the development of physical abilities in general. Furthermore, the PE curricula and lessons in Hungary (and in Europe in general) are based on improving the level of physical and psychological abilities, while in most of Arab countries, the PE lessons are correlated strongly to play and entertaining activities (Mahmoud, 2001). Same tendency can be detected in 11 years old alike, where p values were 0.001 (Egyptian vs Hungarian), 0.007 (Syrian vs Hungarian) and 0.278 (Egyptian vs Syrian).

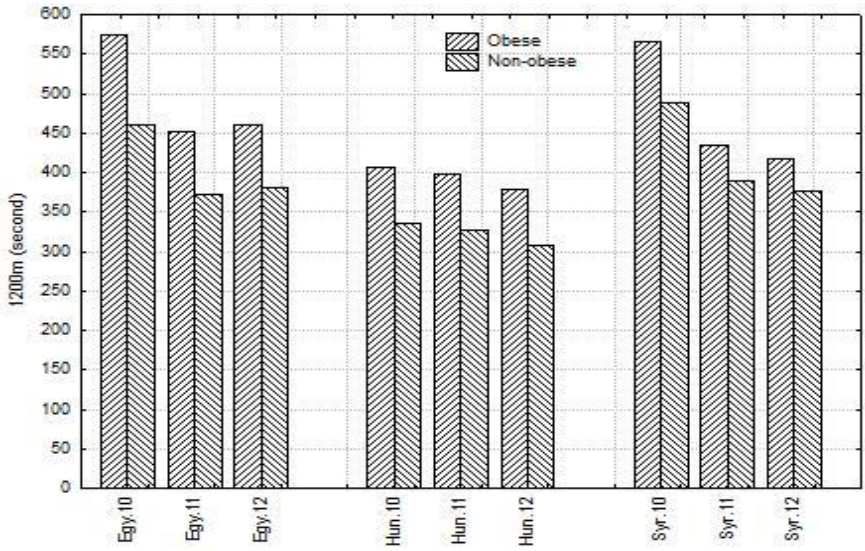
Dissimilarly, in addition to significant differences between the two ethnic groups, there was a significant difference between Syrian and Egyptian boys (p=0.005) where Syrian performed better than their Egyptian mates.

Despite the evidences regarding the low level of cardiorespiratory performance of obese school children, the results of the current investigation were weak in alarming level. Even though, that according to recordable subjective symptoms (sweeting, respiratory rate) children tried to meet their individual maximum. Yet, the 6.30, 10 min. performance (7.2, 11.4 km/h) may evaluated as walking or leisure jogging activity, but not running at any case.

This distressing result became more disturbing and worrying annoying prospect when the comparative analysis between obese and non-obese boys in the three sample showed strongly large variances.

While the non-obese boys 1200m performance was unconvincingly weak (Mahmoud, 2001), obese boy's performance was significantly weaker. Differences were ranging between 0.66 minute in 12 years old Syrian boys and adjacent to two minutes (1.92 min.) in 10 years old Egyptian boys (figure 2).

Figure 2: Comparison of 1200m results between obese and non-obese schoolboys



Statistically, the t-test –additionally- revealed that the differences between obese and non-obese were significant. For 10 years old Egyptian boys (t=7.595, p=0.0001), for 11 years (t=6.914, p=0.0001) and for 12 years (t=7.116, p=0.0001). In Hungarians, for 10 years old boys (t=5.515, p=0.0001), for 11 years old boys (t=6.055, p=0.0001) and for 12 years old boys (t=7.076, p=0.0001). Same tendency can be noticed for Syrians where for 10 years old boys (t=5.043, p=0.0001),

for 11 years old boys (t=3.474, p=0.0007) and for 12 years old boys (t=2.922, p=0.0040).

On the other hand, the results of the current study related to the remarkably low cardiorespiratory performance cannot be attributed to obesity exclusively. In addition, low cardiorespiratory performance of children generally and of obese children's particularly, can be traced back to life style, technical development, lack of regular physical activity, and to the discernable deficiency of mastery of basic motor skills that qualify them for enjoyable and safe practice.

Conclusion:

In conclusion, the current study recognized a high prevalence rate of obesity among school boys aged 10–12 years old in Egypt, Hungary and in Syria. No significant differences were observed between obesity rate in the three samples. Hungarians were taller than Egyptians and Syrians counterparts. The phenomenal shorter body height with wide variabilities in Arab countries may need further researches. Cardiorespiratory performance represented by 1200m results were weak in alarming rate, and despite the significant differences between obese and non-obese boys, both performances were below the desirable limits. Beside obesity factor, weak performances may attribute to country wide intervention for increasing physical activity and acquiring needed motor skills for enjoyable practicing.

Acknowledgments

I would like to express my gratitude to local education directories, principals of schools, physical education teachers and teacher assistants, clubs' trainer and coaches in the three countries for their comprehensive help and unlimited assistants, and to school students for their co-operation. Also, I thank my colleges in Hungary and in

Egypt for their kindness agreements to use student's data according to the purposes of the current research.

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