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Original Article

Frequency and Correlation of Body Mass Index and Waist-Hip Ratio with Fasting Glycemia and Blood Pressure in High School Students from Mexico

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Abstract

Background: Overweight/obesity is a global public health problem in adolescents. Its frequency is increasing as similar to diabetes, hypertension, health expenses, and poor quality of life. Thus, detecting overweight/obesity early in life promises a positive impact on the world's health. **Methods:** In a cross-sectional study, differences were explored between glycemia and blood pressure according to BMI, WHR, age, sex, number of daily meals and family history of chronic diseases in high school students from Mexico City. **Results:** The prevalence of overweight and obesity in the participants (115) was 26% and 7%, respectively. Fasting glycemia (mg/dL) was higher in students aged ,17 vs. .18 (91.45±7.96 vs 87.59±10.06, p=0.038). All hyperglycemic students and with android adipose distribution were women. Compared to the other participants, overweight students had higher systolic (107.24±12.31 vs 115.73±15.28, p=0.003) and diastolic (70.99±10.93 vs 76.27±13.02, p=0.033) mean values (mmHg). Systolic values were higher in obesity (108.77±13.03 vs 118.63±18.38, p=0.048). Men had a higher frequency of systolic (32%, p=0.001) and diastolic (37%, p=0.023) prehypertension/hypertension than women (8% and 17%, respectively). Systolic prehypertension/hypertension was common in overweight (47% vs 53%, p=0.008). Skipping meals was common in students with family history of hypertension (13% vs 87%, p=0.005). **Conclusion:** The prevalence of overweight was higher and of obesity was lower than the one reported in ENSANUT 2016 (22.4% and 13.9%, respectively). Sex differences in blood glucose and pressure were obtained: men had higher blood pressures and women with abdominal fat had higher fasting glycemia. Systolic blood pressure was higher in overweight and obesity.

Key Words: Body Mass Index, Waist-Hip Ratio, Blood glucose, Blood pressure, Students (Source: MeSH-NLM).

Introduction

The prevalence of overweight and obesity in subjects 20 years old and older has significantly increased in the last decades in several countries.[1-2] A similar trend has been observed in Mexico together with the increase of associated morbidities.[3-5] The presence of obesity in children and adolescents is related to impairment of glucose tolerance, insulin resistance, and development of type-2 diabetes (DM2) later in life. Also, those with prehypertension have a higher possibility to develop hypertension in adulthood, while abdominal adiposity has a positive association with insulin resistance, dyslipidemias, DM2, and hypertension in all age stages.[6-15] Thus, describing anthropometric characteristics, fasting glycemia, and family history of obesity-related diseases early in life is useful to create intervention programs with significant impact on the subject's health and expenses in adulthood.[16-18] Our hypothesis was that students from a Mexican private high school with high Body Mass Index (BMI) and/or with high Waist-Hip Ratio (WHR) would have a significantly higher concentration of fasting blood glucose and blood pressure compared to students without the mentioned characteristics.

The aim of our study was to obtain the frequency and correlation of demographic, anthropometric (BMI, WHR), family history of common diseases, and life-style characteristics with fasting glycemia and blood pressure of students of a Mexican private high school.

Methods

From February to March 2016, high school students from the Instituto Tecnológico y de Estudios Superiores de Monterrey (ITESM) in Mexico City (CCM) were invited to carry out this exploratory cross-sectional study. Students were invited to participate through a brief informative presentation shown in different high-school classes by student investigators where selection criteria and the process of consent was explained, pointing out that participants should not have insulin resistance or diabetes, and that those interested in participating, should attend with 6-8 h fasting (only water intake was allowed) and without having exercised before measurements. Appointments were scheduled before students' classes (7 a.m. to 8 a.m.) and measurements were not made if students did not comply with the instructions for consent, fasting and exercise.

Adult students (≥18 years) and parents of under-age participants signed a written informed consent in Spanish language. Under-age students also signed an informed assent. All students who agreed to participate (along with their parents' consent if they were minors) were included in the study. Those who reported insulin resistance, diabetes or with incomplete information were excluded. A printed self-applied questionnaire and all measurements were identified with the subject's number and were taken individually at the school's laboratory.

While they were sitting and after having obtained consent of the students, the participants answered a questionnaire that investigated the following characteristics: sex, age, weekly exercise, hours of exercise, number of daily meals, family history of cancer, cancer-type (classified as without cancer, 3 most common types, and not specified), overweight, obesity, insulin resistance and diabetes. When finished, blood pressure was measured with an electronic wrist sphygmomanometer (Citizen©). Then, capillary blood was taken using

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a sterile lancet to measure 6 to 8-hour fasting glycemia with a digital glucometer (Accu-check® Roche©). At the end of the session, anthropometric measures were taken in a private section of the laboratory. Student's hip and waist circumference was measured with an anthropometric measuring tape (Fiberglass©). Weight (kg) and height (cm) were measured with a scale (Cientifica Vela Quin®). The results were recorded by the student investigator in a section of the questionnaire.

Body Mass Index (BMI) was calculated with the formula: weight (kg)/height^2 (m^2). Waist-Hip Ratio (WHR) was calculated with the formula: waist (cm)/hip (cm). Overweight and obesity were obtained according to the World Health Organization growth reference for 5 to 19 years (Overweight: BMI median+1 SD according to age, Obesity: BMI median+2 SD according to age), and classified and analyzed separately.[41] Adipose distribution according to WHR was classified as gynoid or android (gynoid: women <0.8 and men <1.0, android: women ≥0.8 and men ≥1.0).[19] Glycemia was categorized as normal (70 to 100 mg/dL) and hyperglycemia (>100 mg/dL).[20] Adults' blood pressure was classified according to the JNC7 values for systolic blood pressure as normotensive <120 mmHg and prehypertensive/hypertensive ≥120 mmHg, and for diastolic blood pressure as normotensive <80mmHg and prehypertensive/hypertensive ≥80 mmHg. Blood pressure of underage students was classified as normotensive for those with systolic and/or diastolic blood pressure <90th percentile and prehypertensive/hypertensive with values greater than the 90th percentile, both according to sex, age and height.[21]

The database was constructed in Microsoft Excel® and analyzed in STATA 11 (StataCorp, TX)®. Parameters including mean, standard deviation, median, minimum and maximum quartiles, and skewness were calculated. Mean comparison test (t-test) was used to explore significant differences from zero between groups of variables with normal distribution and Kruskal-Wallis test was used to compare differences between groups of variables with non-normal distribution. Fisher's exact test was performed to compare proportions. Statistical significance was considered with p value <0.05. The post-project registration ID in the ITESM Clinical Research Ethics Committee is DOFI00.

Results

Table 1 shows the summary of the continuous variables of 115 participants. The mean age of the students was 17.43±1.13 years, height 164.90±8.12 cm, hip circumference 97.95±7.67 cm, fasting glycemia 88.93±9.53 mg/dL, systolic and diastolic blood pressure 109.45±13.60 mmHg and 72.36±11.68 mmHg, respectively, and WHR of 0.81±0.06. The median of weight was 60 (p25 55, p75 69) kg, waist circumference 78 (p25 73, p75 83) cm, weekly exercise 1 (p25 1, p75 1.5) hour and BMI 22 (p25 20, p75 24) kg/m^2. Women had significantly lower (p<0.001 in all cases) mean height (160.96±5.43 cm vs 172.3±7.15 cm), systolic pressure (106.01±12.29 mmHg vs 115.9±13.74 mmHg) and WHR (0.79±0.05 vs 0.84±0.05), median weight (57; p25 51, p75 64 kg vs 67.65; p25 60, p75 78 kg) and waist circumference (77; p25 70, p75 82 cm, vs 81; p25 76.5, p75 88 cm, p=0.001) than men. There were no significant differences between the median weight (kg) of men in our study and the one reported by the World Health Organization (WHO) (67.65 vs 67, p=0.749) for the age range of the participants. The same was observed for the median weight of women (57 vs 56, p=0.154) and for median BMI (kg/m^2): men (23 vs 21.5, p=0.081) and women (22 vs 21.1, p=0.165).[41]

Table 1. Summary of quantitative characteristics of 115 students that participated in the study

Characteristic	All participants		Men	Women	*p-value* [d]
Normal distribution	Mean±SD	Skewness	Mean±SD	Mean±SD	
Age (years)	17.43±1.13	-0.89	17.65±1.00	17.31±1.19	0.122
Height (cm)	164.90±8.12	0.29	172.3±7.15	160.96±5.43	**<0.001**
Hip (cm)	97.95±7.67	0.61	99.13±7.48	97.32±7.48	0.231
Fasting glycemia (mg/dL)	88.93±9.53	-0.46	88.68±7.52	89.07±10.49	0.835
Blood pressure (mmHg)					
Systolic	109.45±13.60	0.79	115.9±13.74	106.01±12.29	**<0.001**
Diastolic	72.36±11.68	0.37	74.95±11.76	70.98±11.45	0.083
WHR	0.81±0.06	0.48	0.84±0.05	0.79±0.05	**<0.001**
Non-normal distribution	Median(min,max) [b]	Skewness	Median(min,max) [b]	Median(min,max) [b]	*p* [e]
Weight (kg)	60(55,69)	1.18	67.65(60,78)	57(51,64)	**<0.001**
Waist (cm)	78(73,83)	1.16	81(76.5,88)	77(70,82)	**0.001**
Exercise (h)	1(1,1.5)	1.96	1(0,1.5)	1(1,1.5)	0.593
BMI (kg/m^2)	22(20,24)	1.4	23(21,25.5)	22(20,24)	0.336

Legend: SD: Standard Deviation, BMI: Body Mass Index, WHR: Waist-Hip Ratio, [b] 25th percentile=p25,75th percentile=p75, [d] p value for Student's t test, [e] p value for Kruskal-Wallis equality of populations rank test.

The distribution of subjects and their categorized characteristics according to sex is shown in ***Table 2.*** Regarding all participants, there was a higher participation of women (75/115; 65%) than men (40/115; 35%). Most students had normal fasting glycemia (107/115; 93%), systolic (96/115; 83%) and diastolic blood pressure values (87/115; 76%). The frequency overweight was 26% (30/115) and of obesity 7% (8/115). Family history of cancer was common (63/115; 55%), being breast cancer the most frequent (14/115; 12%). Family history of insulin resistance (41/115; 36%), diabetes (76/115; 66%), hypertension (61/115; 53%) or overweight/obesity (81/115; 70%) was common. According to sex, significant differences were found. All students with hyperglycemia (8) and all with android adipose distribution (33) were women (p=0.049 and p<0.001, respectively). Conversely, men had significantly higher prehypertension/hypertension systolic (13/40; 32%) and diastolic (15/40; 37%) frequencies (p=0.001 and p=0.023, respectively) and of obesity (4/40; 10%, p=0.446, not significant). There were no significant differences for age (p=0.538), overweight (p=0.510), and obesity (p=0.446).

Table 3 shows the distribution of subjects according to obesity. The frequency of obesity in young participants (≤17 years) was significantly higher (7/8; 88%, p=0.002) than the older ones (1/7; 12%). All students with obesity had normal glycemia (p>0.999) and some showed systolic (3/8; 37%, p=0.125) and/or diastolic prehypertension/hypertension (3/8; 37%, p=0.401). Most obese students (6/8; 75%, p>0.999) had gynoid adipose distribution, family history of cancer (7/8; 88%, p=0.071), being breast the most common type (2/8; 24%, p=0.746), without significant differences between groups. Family history of insulin resistance was significantly higher in obesity (6/8; 75%, p=0.024), report of diabetes (7/8; 88%, p=0.262), overweight or obesity (6/8; 75%, p>0.999) but without statistical significance.

Table 2. Distribution of the participants according to sex and the categorized characteristics

Characteristic	All (n=115)	Men (n=40)	Women (n=75)	*p* [d]
Age (years)	n (%)	n (%)	n (%)	
≤17	40 (35)	12 (30)	28 (37)	0.538
≥18	75 (65)	28 (70)	47 (63)	
Fasting glycemia (mg/dL)				
≤100	107 (93)	40 (100)	67 (89)	**0.049**
≥101	8 (7)	0 (0)	8 (11)	
Systolic blood pressure (mmHg)				
Normal	96 (83)	27 (68)	69 (92)	**0.001**
Prehypertension/ Hypertension	19 (17)	13 (32)	6 (8)	
Diastolic blood pressure (mmHg)				
Normal	87 (76)	25 (63)	62 (83)	**0.023**
Prehypertension/ Hypertension	28 (24)	15 (37)	13 (17)	
Overweight[a]				
No	85 (74)	28 (70)	57 (76)	0.51
Yes	30 (26)	12 (30)	18 (24)	
Obesity[b]				
No	107 (93)	36 (90)	71 (95)	0.446
Yes	8 (7)	4 (10)	4 (5)	
WHR[c]				
Gynoid	82 (71)	40 (100)	42 (56)	**<0.001**
Android	33 (29)	0 (0)	33 (44)	
Family history of cancer				
No	52 (45)	21 (52)	31 (41)	0.326
Yes	63 (55)	19 (48)	44 (59)	
Family history of cancer type				
None	52 (45)	15 (37)	37 (50)	0.325
Breast	14 (12)	7 (18)	7 (9)	
Lung	7 (6)	2 (5)	5 (7)	
Pancreas	4 (4)	3 (7)	1 (1)	
Other	36 (31)	12 (30)	24 (32)	
Not specified	2 (2)	1 (3)	1 (1)	
Family history of insulin resistance				
No	74 (64)	26 (65)	48 (64)	>0.999
Yes	41 (36)	14 (35)	27 (36)	
Family history of diabetes				
No	39 (34)	11 (27)	28 (37)	0.31
Yes	76 (66)	29 (73)	47 (63)	
Family history of hypertension				
No	54 (47)	18 (45)	36 (48)	0.845
Yes	61 (53)	22 (55)	39 (52)	
Family history of overweight and/or obesity				
No	34 (30)	13 (32)	21 (28)	0.67
Yes	81 (70)	27 (68)	54 (72)	

Legend: [a]BMI: median+1SD according to age, [b]BMI median+2SD according to age, [c]Gynoid: women <0.8 and men <1.0, Android: women ≥0.8 and men ≥1.0, [d] *p* value for Fisher's exact test.

The difference of fasting glycemia mean values between groups is shown in ***Table 4***. Students ≤17 years had significantly higher mean values (91.45±7.96 mg/dL, *p*=0.038) than older ones (87.59±10.06 mg/dL). Sex (*p*=0.835), overweight (*p*=0.491), obesity (*p*=0.892) and WHR (*p*=0.201) did not show significant differences between groups.

Table 3. Distribution of the student's characteristics and obesity

Characteristic (115)	Obesity [b]		*p* [d]
	No (107)	Yes (8)	
	n (%)	n (%)	
Age (years)			
≤17 (40)	33 (31)	7 (88)	**0.002**
≥18 (75)	74 (69)	1 (12)	
Fasting glycemia (mg/dL)			
≤100 (107)	99 (93)	8 (100)	>0.999
≥101 (8)	8 (7)	0 (0)	
Systolic blood pressure (mmHg)			
Normal (96)	91 (85)	5 (63)	0.125
Prehypertension/Hypertension (19)	16 (15)	3 (37)	
Diastolic blood pressure (mmHg)			
Normal (87)	82 (77)	5 (63)	0.401
Prehypertension/Hypertension (28)	25 (23)	3 (37)	
WHR[c]			
Gynoid (82)	76 (71)	6 (75)	>0.999
Android (33)	31 (29)	2 (25)	
Family history of cancer			
No (52)	51 (48)	1 (12)	0.071
Yes (63)	56 (52)	7 (88)	
Family history of cancer type			
None (52)	49 (46)	3 (38)	0.746
Breast (14)	12 (11)	2 (24)	
Lung (7)	7 (6)	0 (0)	
Pancreas (4)	4 (4)	0 (0)	
Other (36)	33 (31)	3 (38)	
Not specified (2)	2 (2)	0 (0)	
Family history of insulin resistance			
No (74)	72 (67)	2 (25)	0.024
Yes (41)	35 (33)	6 (75)	
Family history of diabetes			
No (39)	38 (36)	1 (12)	0.262
Yes (76)	69 (64)	7 (88)	
Family history of hypertension			
No (54)	50 (47)	4 (50)	>0.999
Yes (61)	57 (53)	4 (50)	
Family history of overweight and/or obesity			
No (34)	32 (30)	2 (25)	>0.999
Yes (81)	75 (70)	6 (75)	

Legend: [b] BMI median+2SD according to age, [c] Gynoid: women <0.8 and men <1.0, Android: women ≥0.8 and men ≥1.0, [d] *p* value for Fisher's exact test.

All hyperglycemic students were women (*p*=0.049) (***Table 5***). The prevalence of android adipose distribution of hyperglycemic students was significantly higher (6/8; 75%, *p*=0.007) than gynoid adipose distribution (2/8; 25%). Other variables did not show significant differences between groups.

The summary of students' blood pressure is shown in ***Table 6***. No significant differences were found between mean blood pressure and age (systolic *p*=0.628 and diastolic *p*=0.392). Overweight students had significantly higher mean systolic (115.73±15.28 mmHg, *p*=0.003) and diastolic blood pressure (76.27±13.02 mmHg, *p*=0.033) than the rest of the participants (107.24±12.31 mmHg, 70.99±10.93 mmHg, respectively). The mean of systolic pressure (mmHg) was significantly higher in obese students (108.77±13.03 vs 118.63±18.38 *p*=0.048) and no significant differences were found for diastolic values (*p*=0.210). Students with

gynoid adipose distribution had significantly higher systolic blood pressure (111.59±14.67 mmHg, p=0.008) than those with android adipose distribution (104.15±8.63 mmHg). A same trend was observed in ***Table 7***; the prevalence overweight (10/19; 53%) or gynoid adipose distribution (18/19; 95%) was significantly higher in those with systolic prehypertension/hypertension (p=0.008 and p=0.012, respectively). The other variables explored had no significant differences between groups.

The distribution of students according to the number of daily meals is shown in ***Table 8***. Most students reported having ≥3 daily meals (100/115; 87%). Among students that skipped meals, the higher frequency was found in women (13/15; 87%, p=0.082), in normoglycemic participants (14/15; 93%, p>0.999), in those with normal systolic and diastolic pressure (14/15; 93%, p=0.459 and 12/15; 80%, p>0.999, respectively), in those without overweight (12/15; 80%, p=0.756) or who were not obese (14/15; 93%, p>0.999) and in those with gynoid adipose distribution (9/15; 60%, p=0.361). All these differences were not significant. Also, the higher frequency of students that skipped meals was found in those with family history of cancer (10/15; 67%, p=0.409), diabetes (12/15; 80%, p=0.259), overweight/obesity (10/15; 67%, p=0.765), and was significant for hypertension (13/15; 87%, p=0.005).

Discussion

The aim of our study was to describe and correlate the demographic and anthropometric characteristics of the participants. Similar information has been analyzed worldwide where the description of the frequency and tendency of the increase of high BMI has been useful to justify prevention programs in youngsters.[8,13,15] The increase in the prevalence of overweight and obesity has been registered from 1999 to 2016 in Mexican teenagers (between 12 and 19 years old) from general population.[3-4] In 2016, the combined prevalence of overweight and obesity reached 36.3%. In this report, the prevalence of overweight was 22.4% (women 26.4% and men 19.6%) and for obesity was 13.9% (women 12.8% and men 14.5%).[5] According to our results (***Table 2***), the prevalence of overweight students was higher (30/115; 26%, p=0.172) and for obesity was significantly lower (8/115; 7%, p=0.016) than the reported for teenagers in 2016 (data not in table). Men showed a higher frequency of both parameters than women, being the prevalence of overweight significantly higher (12/40; 30%, p=0.049) than the one of 2016; obesity was less frequent, but without statistical significance (4/40; 10%, p=0.219, data not in table). In contrast, the prevalence of overweight and obesity in women was higher in 2016 (26.4% and 12.8%) than in our study (18/75; 24% and 4/75; 5%, respectively), being significant for obesity (p=0.027, data not in table).[5] Most obese students (***Table 3***) were ≤17 years (7/8; 88%, p=0.002), which represents a risk of early onset of insulin resistance. In high-income countries like the United States (U.S.), the risk of overweight in white adolescent girls increases as socioeconomic status decreases, whereas in black population the opposite occurs.[4]

Table 4. Distribution of the student's characteristics and the fasting glycemia

Characteristic	Fasting glycemia (mg/dL)	
	Mean±SD	p [d]
Age (years)		
≤17	91.45±7.96	**0.038**
≥18	87.59±10.06	
Sex		
Male	88.68±7.52	0.835
Female	89.07±10.49	
Overweight[a]		
No	88.56±9.65	0.491
Yes	89.97±9.28	
Obesity[b]		
No	88.90±9.64	0.892
Yes	89.38±8.48	
WHR[c]		
Gynoid	88.21±8.78	0.201
Android	90.73±11.14	

Legend: SD: Standard Deviation, [a] BMI: median+1SD according to age, [b] BMI median+2SD according to age, [c] Gynoid: women <0.8 and men <1.0, Android: women ≥0.8 and men ≥1.0, [d] p value for Student's t test.

Table 5. Categorized fasting glycemia and the characteristics of the participants

Characteristic (115)	Fasting glycemia (mg/dL)		
	≤100 (n=107)	≥101 (n=8)	p [d]
	n (%)	n (%)	
Age (years)			
≤17 (40)	36 (34)	4 (50)	0.446
≥18 (75)	71 (66)	4 (50)	
Sex			
Male (40)	40 (37)	0 (0)	**0.049**
Female (75)	67 (63)	8 (100)	
Systolic pressure (mmHg)			
Normal (96)	89 (83)	7 (88)	>0.999
Prehypertension/Hypertension (19)	18 (17)	1 (13)	
Diastolic pressure (mmHg)			
Normal (87)	80 (75)	7 (88)	0.677
Prehypertension/Hypertension (28)	27 (25)	1 (12)	
Overweight[a]			
No (85)	78 (73)	7 (88)	0.678
Yes (30)	29 (27)	1 (12)	
Obesity[b]			
No (107)	99 (93)	8 (100)	>0.999
Yes (8)	8 (7)	0 (0)	
WHR[c]			
Gynoid (82)	80 (75)	2 (25)	**0.007**
Android (33)	27 (25)	6 (75)	
Family history of cancer			
No (52)	50 (47)	2 (25)	0.29
Yes (63)	57 (53)	6 (75)	
Family history of cancer type			
None (52)	49 (46)	3 (37)	0.593
Breast (14)	12 (11)	2 (25)	
Lung (7)	6 (5)	1 (13)	
Pancreas (4)	4 (4)	0 (0)	
Other (36)	34 (32)	2 (25)	
Not specified (2)	2 (2)	0 (0)	
Family history of insulin resistance			
No (74)	70 (65)	4 (50)	0.453
Yes (41)	37 (35)	4 (50)	
Family history of diabetes			
No (39)	38 (36)	1 (12)	0.262
Yes (76)	69 (64)	7 (88)	
Family history of hypertension			
No (54)	50 (47)	4 (50)	>0.999
Yes (61)	57 (53)	4 (50)	
Family history of overweight and/or obesity			
No (34)	33 (31)	1 (13)	0.433
Yes (81)	74 (69)	7 (87)	

Legend: [a] BMI: median+1SD according to age, [b] BMI median+2SD according to age, [c] Gynoid: women <0.8 and men <1.0, Android: women ≥0.8 and men ≥1.0, [d] p value for Fisher's exact test.

Table 6. Summary of the student's blood pressure according to their characteristics

Characteristic	Systolic (mmHg)		Diastolic (mmHg)	
	Mean±SD	*p* [d]	Mean±SD	*p* [d]
Age (years)				
≤17	110.3±16.93	0.628	73.65±12.40	0.392
≥18	109.0±11.55		71.68±11.31	
Overweight[a]				
No	107.24±12.31	**0.003**	70.99±10.93	**0.033**
Yes	115.73±15.28		76.27±13.02	
Obesity[b]				
No	108.77±13.03	**0.048**	71.99±11.62	0.21
Yes	118.63±18.38		77.38±12.18	
WHR[c]				
Gynoid	111.59±14.67	**0.008**	73.65±12.08	0.064
Android	104.15±8.63		69.18±10.12	

Legend: SD: Standard Deviation, [a] BMI: median+1SD according to age, [b] BMI median+2SD according to age, [c] Gynoid: women <0.8 and men <1.0, Android: women ≥0.8 and men ≥1.0, [d] *p* value for Student's t test.

In England and in other developed countries, white teenagers with less than median income, have a higher prevalence of overweight and obesity, a marked trend in girls.[47-48] The correlation between high BMI and socioeconomic status in developing countries is not clear; in those with low-income is positive for men and women and in middle-income countries de association is mixed for men and mainly negative for women. [37] The participants in our study belong to a socioeconomic group in Mexico that live in the city, is highly educated, with medium-high household income, and has access to health and food services.[36] In Mexico, well-off adolescents (attending to private school, remunerated job, and mother's higher level of education) had a higher probability of overweight or obesity.[38] Also, those that live in urban areas have a higher prevalence of overweight or obesity, being the latter more frequent in adolescents of the highest quintile of Household Living Condition Index (income per capita, literacy rate, and life expectancy).[49] The higher frequency of overweight found in male participants in our study may reflect trend of this parameter in high income Mexican population.

We were unable to detect significant differences between glycemia and BMI: all students with obesity were normoglycemic (***Table 3***) and no significant differences between mean values of fasting glycemia and high BMI were found (***Table 4***). On the other hand, significant differences were found for sex (all students with hyperglycemia were women, *p*=0.049, ***Table 2***) and age (mean values were significantly higher in participants <=17 years, *p*=0.038, ***Table 4***). Studies have reported no correlation between mean fasting glycemia in Mexican teenagers (between 12 and 15 years) and overweight or obesity. Other reports show a significant correlation of overweight and obesity and insulin resistance and with high systolic and diastolic blood pressure in Mexican adolescents.[8] Students with obesity in our study had a significantly higher prevalence of family history of insulin resistance (6/8; 75%, *p*=0.024), suggesting a trend of family unhealthy lifestyle or inherited biological risk factors. In relation to this, obesity is associated to breast, colon, endometrial, esophageal, gall bladder and renal cancer, mainly because of insulin resistance and DM2, events that produce chronic inflammation and tolerance, sustaining proliferative signals (through IGF-1 axis, leptin and adipokines) and low levels of glucagon and of adiponectin.[43-45] Related to the above, we did not find a significant correlation between family history of cancer and student's obesity (*p*=0.071, ***Table 3***). Also, we did not explore BMI of the reported cases to analyze correlations, including those for the current student's BMI.

We observed that students with hyperglycemia had significantly higher frequency of android adipose distribution (*p*=0.007, ***Table 5***), confirming our hypothesis for high WHR. Women had significantly higher frequency of android adipose distribution (44%, *p*<0.001) and all men had gynoid adipose distribution (***Table 2***). Android adipose distribution comprises excess fat in the upper body region (particularly in the abdomen) that has been associated to DM2, deficient cardiac mechanics, systolic dysfunction and hypertension.[10-12] In teenagers from 9 to 17 years, android adipose distribution has been associated to dyslipidemia and systolic blood pressure.[14] Thus, the hyperglycemic women with android adipose distribution found in our study may be at risk of developing DM2 and/or cardiovascular diseases in the future if not promptly treated. A contrasting result was that students with gynoid adipose distribution showed significantly higher (*p*=0.008) systolic blood pressure than those with android adipose distribution (***Table 6***). It has been reported that in children and adolescents, the risk of hypertension may not be directly associated with BMI or WHR as in adults, instead, subscapular and triceps skinfold thickness could be more related to it.[46] In future studies, the distribution of body fat in teenagers should be measured also taking into account these parameters to compare them.

We encountered significant correlations between high BMI and high blood pressure. Overweight students had mean systolic and diastolic blood pressure significantly higher (*p*=0.003 and *p*=0.033, respectively) than the rest of the participants (***Table 6***). Also, students with obesity, showed a significantly higher systolic mean value (*p*=0.048) than the other participants. With categorized variables (***Table 7***), overweight students showed a significantly higher prevalence of systolic prehypertension/hypertension (*p*=0.008). These students are at risk of maintaining high blood pressure values and reaching chronic diseases like hypertension in adulthood if their high BMI is not reduced with lifestyle changes, education and/or diet intervention.[13] High BMI accounts for 2.7 million deaths globally.[2] Obesity increases the risk of DM2, cancer and cardiovascular diseases in adolescence and adulthood.[32-34] Prehypertension/high BMI in adolescence is linked to the development of hypertension 2 years later, being more frequent in boys (68%) than in girls (43%). [33] Coincidently, we also found that male adolescents had a significantly higher frequency of systolic (*p*=0.001) and diastolic prehypertension/ hypertension (*p*=0.023) than women (***Table 2***). Hypertension is the most common comorbidity in overweight adolescents; each unit of increase of BMI is associated with a higher risk of systolic blood pressure >130 mmHg.[35] Factors like age, ethnicity, family history of hypertension and/or DM2, genetic polymorphisms, low birth weight, pubertal status, insufficient physical activity, poor sleep quality, reduced adiponectin, dyslipidemia and inappropriate sodium/ potassium intake are also positively associated to the development of hypertension in adulthood.[6] Reports show that the prevalence of prehypertension/hypertension in teenagers in the U.S. is around 10% and the trajectory of blood pressure appears to lag 10 years behind of BMI.[1] Thus, interventions that reduce the incidence of overweight and obesity in teenagers may prevent the development of hypertension and cardiovascular complications as adults.

We evaluated weekly hours of exercise and number of daily meals as part of the students' habits. We found that participants practiced exercise (1 h median weekly exercise, ***Table 1***) but there was no significant difference with any of the variables evaluated. It has been reported that interventions focused on practicing exercise, school-health centers, healthy eating and food policies have a beneficial role in preventing overweight and obesity in school-age children and that would impact in adolescence.[16-18] Most of the participants in our study (100/115; 87%) answered they had three meals per day (***Table 8***), but women had a higher frequency of skipping them, without significance (p=0.082). We also found that 40% (6/15) of the participants that skipped meals had android adipose distribution and all of them were women. Skipping meals and snacking have become frequent; a difficult distinction between typical breakfast, lunch and dinner has emerged.[24] The prevalence of skipping meals in adults varies from 5 to 83%, being males more likely to skip any meal and women to skip lunch and dinner.[23] Conversely, as we found in our study, adolescent girls have a higher frequency of skipping any meal and men tend to skip breakfast and lunch and, in general, breakfast is the meal least consumed.[23,25-27] This behavior has an impact of the quality of the ingested food and in the subject's health; the odds of skipping meals decreases the daily consumption of healthy food and increases the consumption of junk

food (fat-rich), leading to increase the waist circumference and to develop metabolic alterations.[27,30] As a consequence, skipping breakfast has been associated with increased prevalence of obesity, android adipose distribution, dyslipidemia, hyperinsulinemia and hyperglycemia.[24-25,28-29] Even though healthy lifestyle considers the consumption of breakfast, lunch and dinner as main meals, (1 to 3 snacks between them), skipping them is a common practice wrongly considered a way to reduce energy intake (lose weight).[31] On the other hand, family history of hypertension was more frequent students that skipped meals (13/15; 87%, p=0.005). In this sense, skipping meals, especially breakfast, is related increased adiposity indicators and it is related to metabolic changes that predispose the development of chronic diseases.[26] Eating in misalignment with the biological clock (skipping breakfast and consuming copious meals in the evening or eating late at night) has long-term effects as developing metabolic syndrome, increased risk of obesity, DM2 and coronary heart disease.[31,40]

We are aware of the limitations of our exploratory cross-sectional study: no causality can be inferred, we included all students that voluntarily agreed to participate (self-selection of the population and low sample size) and they don't represent all high school students or adolescents in Mexico. They are a subgroup of private school students with different characteristics from the general population. We could have measured glycosylated hemoglobin to obtain a more accurate approach of glucose metabolism. Also, the measurement of weekly exercise could have been more effective with a smartphone application (widely used by youngsters) as it has been reported for walkability inequality.[22] Likewise; we need of a more detailed description of daily meals (type and snacks) of the participants. Another point is that family reports rely on the student's memory and certain bias may be experienced (close relatives are remembered better than distant ones and the participant's age may influence the report). All these observations could have been adjusted if the questionnaire validation had been carried out.

Table 7. Distribution of the high school students according to their blood pressure and other characteristics

Characteristic (n=115)	Systolic (mmHg)			Diastolic (mmHg)		
	Normal (n=96)	Prehypertension/hypertension (n=19)	p[d]	Normal (n=87)	Prehypertension/hypertension (n=28)	p [d]
	n (%)	n (%)		n (%)	n (%)	
Age (years)						
≤17 (40)	34 (35)	6 (32)	0.799	31 (36)	9 (32)	0.822
≥18 (75)	62 (65)	13 (68)		56 (64)	19 (68)	
Overweight[a]						
No (85)	76 (79)	9 (47)	**0.008**	68 (78)	17 (61)	0.085
Yes (30)	20 (21)	10 (53)		19 (22)	11 (39)	
WHR[c]						
Gynoid (82)	64 (67)	18 (95)	**0.012**	59 (68)	23 (82)	0.229
Android (33)	32 (33)	1 (5)		28 (32)	5 (18)	
Family history of cancer						
No (52)	46 (48)	6 (32)	0.217	38 (43)	14 (52)	0.509
Yes (63)	50 (52)	13 (68)		50 (57)	13 (48)	
Family history of cancer type						
None (52)	43 (45)	9 (48)	0.682	41 (47)	11 (39)	0.787
Breast (14)	11 (12)	3 (16)		10 (12)	4 (14)	
Lung (7)	6 (6)	1 (5)		4 (5)	3 (11)	
Pancreas (4)	4 (4)	0 (0)		3 (3)	1 (4)	
Other (36)	31 (32)	5 (26)		27 (31)	9 (32)	
Not specified (2)	1 (1)	1 (5)		2 (2)	0 (0)	
Family history of insulin resistance						
No (74)	64 (67)	10 (53)	0.297	55 (63)	19 (68)	0.821
Yes (41)	32 (33)	9 (47)		32 (37)	9 (32)	
Family history of diabetes						
No (39)	34 (35)	5 (26)	0.598	30 (34)	9 (32)	>0.999
Yes (76)	62 (65)	14 (74)		57 (66)	19 (68)	
Family history of hypertension						
No (54)	46 (48)	8 (42)	0.802	42 (48)	12 (43)	0.668
Yes (61)	50 (52)	11 (58)		45 (52)	16 (57)	
Family history of overweight and/or obesity						
No (34)	30 (31)	4 (21)	0.426	28 (32)	6 (21)	0.346
Yes (81)	66 (69)	15 (79)		59 (68)	22 (79)	

Legend: [a]BMI: median+1SD according to age, [b]BMI median+2SD according to age, [c]Gynoid: women <0.8 and men <1.0, Android: women ≥0.8 and men ≥1.0, [d]p value for Fisher's exact test.

Table 8. Distribution of the student's characteristics and number of daily meals

Characteristic (115)	<3 meals (n=15)	≥3 meals (n=100)	*p* [d]
	n (%)	n (%)	
Age (years)			
≤17 (40)	5 (33)	35 (35)	>0.999
≥18 (75)	10 (67)	65 (65)	
Sex			
Male (40)	2 (13)	38 (38)	0.082
Female (75)	13 (87)	62 (62)	
Fasting glycemia (mg/dL)			
≤100 (107)	14 (93)	93 (93)	>0.999
≥101 (8)	1 (7)	7 (7)	
Systolic blood pressure (mmHg)			
Normal (96)	14 (93)	82 (82)	0.459
Prehypertension/ Hypertension (19)	1 (7)	18 (18)	
Diastolic blood pressure (mmHg)			
Normal (87)	12 (80)	75 (75)	>0.999
Prehypertension/ Hypertension (18)	3 (20)	25 (25)	
Overweight[a]			
No (85)	12 (80)	73 (73)	0.756
Yes (30)	3 (20)	27 (27)	
Obesity[b]			
No (107)	14 (93)	93 (93)	>0.999
Yes (8)	1 (7)	7 (7)	
WHR[c]			
Gynoid (82)	9 (60)	73 (73)	0.361
Android (33)	6 (40)	27 (27)	
Family history of cancer			
No (52)	5 (33)	47 (47)	0.409
Yes (63)	10 (67)	53 (53)	
Family history of cancer type			
None (52)	6 (40)	46 (46)	0.685
Breast (14)	1 (7)	13 (13)	
Lung (7)	2 (13)	5 (5)	
Pancreas (4)	0 (0)	4 (4)	
Other (36)	6 (40)	30 (30)	
Not specified (2)	0 (0)	2 (2)	
Family history of insulin resistance			
No (74)	10 (67)	64 (64)	>0.999
Yes (41)	5 (33)	36 (36)	
Family history of diabetes			
No (39)	3 (20)	36 (36)	0.259
Yes (76)	12 (80)	64 (64)	
Family history of hypertension			
No (54)	2 (13)	52 (52)	**0.005**
Yes (61)	13 (87)	48 (48)	
Family history of overweight and/or obesity			
No (34)	5 (33)	29 (29)	0.765
Yes (81)	10 (67)	71 (71)	

Legend: [a] BMI: median+1SD according to age, [b] BMI median+2SD according to age, [c] Gynoid: women <0.8 and men <1.0, Android: women ≥0.8 and men ≥1.0, [d] *p* value for Fisher's exact test.

We conclude that, the participants of this study, specifically male students, had a higher prevalence of overweight than the one of general population with the same age range. In contrast, the prevalence of obesity in the studied population was lower than the one reported for general population. Participants showed a correlation of overweight and obesity with high blood pressure, especially men. On the other hand, the group of younger students showed higher fasting glycemia, especially women when android adipose distribution was present. Our findings reinforce the idea of creating a better intervention program than the current one in this high school (the current approach is to address related information in health class, with infographics about breakfast around the campus and Institute's on-line information) in order to reduce the number of overweight and obese students.[42] Several interventions could be created focused on public health action, which implies changing the context of the students instead of only showing information about the risks of high BMI. An example would be reducing the availability of fat-rich food, salt or increasing vegetables in the menu of the school's cafeteria and in the products offered in vending machines placed all around the campus, together with the need to encourage students to consume healthier food.[39] The results of our study are helpful as they describe anthropometric parameters and markers of early onset of metabolic and cardiovascular diseases in a group of teenagers that has not been thoroughly studied. Thus, we recommend carrying out similar studies around the country (reducing the limitations of the present report) in order to create group-fitted health policies/programs nationwide.

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Original Article

Impact of Family History on Acute Appendicitis – An Iraqi Study at Baghdad Teaching Hospital

Tabarek Yaseen, Zahraa Qais, Zahraa Abass.[1]

Abstract

Background: Appendicitis is one of the most common causes of the acute abdomen worldwide, but many patients present with atypical signs and symptoms. The study aimed to evaluate the impact of positive family history in the diagnosis of appendicitis in a limited diagnostic setting. **Methods:** Gender matched case control study of ratio (1:2) was carried out from July 2016 to September 2016 with a sample size of 300 patients. Cases were patients presented in surgical department with acute abdominal pain diagnosed as having appendicitis for whom appendectomy was performed, while controls were hospital based with other abdominal problems. Data was collected using a questionnaire. Primary analysis was a Chi square ($\chi 2$) test and the calculation of odds ratio (OR) for the association between final diagnosis of appendicitis and family history. **Results:** Females were 55% in both groups. Cases were younger than controls (27.05± 12.58 vs. 42.43±17.39 years). Positive family history of appendectomy was higher among cases (66%) than controls (31.5%). The diagnosis of acute appendicitis was 3.8 times higher among those with positive family history of appendectomy and abdominal pain, with a sensitivity of 66% and a specificity of 66.4%. Cases with more than one relative with family history of appendectomy, increased suspicion by 13 times when compared to those without family history. **Conclusion:** Positive family history of appendectomy in patients with acute abdominal pain and more than one relative with history of appendicitis can be considered as important parameters in the diagnosis of appendicitis in limited diagnostic setting.

Key Words: Acute Appendicitis, Family History, Risk Factor, Appendectomy, Emergency (Source: MeSH-NLM).

Introduction

The appendix is a blind muscular tube with mucosal, submucosal, muscular and serosal layers of length that varies between 7.5-10 cm and a diameter of 7-8 mm. It has the same structure of the colonic wall with more lymphoid tissue, about 200 lymphoid follicles that reach its peak during 10-30 years of age, decline after the 30s and disappear totally after 60 years of age.[1] Its importance comes from its tendency to inflame; it appears to play an immunological role by its lymphoid tissue and the production of immunoglobulins, especially immunoglobulin A (IgA).[1] 7% of the world's population has the risk of acute appendicitis throughout their lives.[1-3] In the United States 1/7-1/17 has acute appendicitis.[4]

Appendicitis can occur in any age with highest incidence in late teenage years and early adulthood (20s).[5] Pathogenic stimulation can lead to lymphoid hypertrophy and luminal obstruction.[2,6] Immature immune system/defective immunity makes the occurrence of acute appendicitis rare in the extremes of age.[6]

Appendectomy is the most common performed surgery in the emergency department; it constitutes 1-2% of all surgical operations.[7] It has a mortality rate of 0.1% that can reach 0.6% in the gangrenous type and may go above 20% in elderly as a result of the delayed diagnosis and intervention. The incidence rate among elderly is increasing, as well as the chance of complications.[8] The Diagnosis is mainly clinical.[3] Accurate pre-operative diagnosis of acute appendicitis remains difficult especially for the atypical presentation, which is found in about 30-45% of patients with acute appendicitis.[9-11] Misdiagnosis is more than 50% in elderly and children, and the chance of perforation increases with the delay of diagnosis.[12] Diagnostic tools such as ultrasound, Computed Tomography scan (CT scan), Magnetic Resonance Imaging (MRI), radiology and laparoscopy may also be needed. An Alvarado score of seven or more is strongly predictive of acute appendicitis. Alvarado scoring system is easy, simple, cheap and aids in the diagnosis of acute appendicitis when other diagnostic techniques are unavailable.[1,13] Negative appendectomy is still found, especially in a limited diagnostic setting, despite the development of diagnostic techniques.[14] It is associated with unnecessary cost and complications.[14] After 1995, there was a fall in the rate of negative appendectomies because of the CT scan and laparoscopy: in the United States, negative appendectomies had decreased from 14.7% in 1998 to 8.47% in 2007.[6,15] Appendectomy is the main management of appendicitis, even if antibiotics do the job, prophylactic appendectomy is done.[16,17] Obstruction of the lumen and infection are the main pathophysiological mechanisms.[18] Genetics has its effect on incidence as well as severity of the disease through cytokines and anti-inflammatory substances, like Interleukin-6 genes (IL6 genes), but environment seems to affect the role of genetics as in the hygiene theory. Evidence showed that Interleukin-8 (IL8), Interleukin-1B (IL1B), IL6, and Interleukin-6 Receptor (IL6R) are involved in the pathogenesis.[19,20] Complex segregation analysis supports a multifactorial or polygenic mode of heredity in about 56% of cases, with no evidence that supports the presence of a major gene.[7,21-22] Serotonin level, which has a genetic determinant, as well as electrolytes to some extent, play a role in pathogenesis.[23]

The objective of the study is to evaluate the association between acute appendicitis and family history, to detect a difference between the null hypothesis, stating that positive family history is present in all groups, and the alternative hypothesis, stating that the proportion in the case group is higher than that in the control group.

Many studies showed that there is a familial predisposition to acute appendicitis and that half the variability of acute appendicitis is due to a genetic factor. Twin studies suggested that environmental factor and genetic factor contribute to 70% and 30%, respectively, to the incidence of appendicitis.[3] Researchers concluded that a positive family history of acute appendicitis increased the potential risk in a patient even in the absence of the typical signs and symptoms.[7,24,25] These studies dealt with family history but without testing the impact of the affected relatives' number on the diagnosis. In the current study, the sensitivity

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and specificity, as well as the positive and negative predictive values of family history were compared to those of Alvarado score. This is the first study to provide such data about the Iraqi population.

As mentioned before, up to 45% of those with appendicitis have atypical presentation, and misdiagnosis may reach 50% in age extremes. These, in addition to negative appendectomy with its complications and delayed management with its mortality and morbidity rates, are more common in the limited diagnostic setting. Predictors like a family history of acute appendicitis, especially when more than one relative is affected, as well as simple diagnostic tools like the complete blood count and ultrasound, can support the clinical diagnosis.

The aim of the study is to evaluate the impact of a positive family history on the diagnosis of appendicitis in a limited diagnostic setting.

Methods

A gender-matched case-control study of a 1:2 ratio was carried out from July 2016 to September 2016 at Baghdad Teaching Hospital, Medical City Health Directorate. A convenient sample of 300 patients was used, 100 of them were present in the surgical department with acute abdominal pain (cases), for whom appendectomy was performed after the diagnosis of acute appendicitis was established, while the other 200 presented to the medical/surgical department with other abdominal problems either with/without abdominal pain (hepatic, pancreatic, gynecological, urological and renal problems), those were included as controls.

The controls shared symptom/sign with appendicitis; this made the study of the impact of a positive family history of appendectomy on the diagnosis of acute appendicitis more realistic and applicable, and reduced recall and response bias among the control group.

To detect a difference between the null hypothesis, stating that positive family history is present in all groups, and the alternative hypothesis, stating that the proportion in the case group is higher than the control group, all patients, who presented at the time of data collection and agreed to participate, were included in the study according to the diagnosis, while anyone with a previous history of appendectomy and unknown family history of appendectomy was excluded. Patients were initially divided according to their diagnosis into two groups (cases, controls), then control groups were divided into two subgroups according to the presence of abdominal pain, then the two groups were divided into three subgroups according to the number of relatives with positive family history of appendectomy due to acute appendicitis (negative family history, one relative with history of appendectomy, more than one relative).

A questionnaire form was prepared by the authors to collect data from both cases and controls through a direct interview with each participant; the form included: age, sex, definite diagnosis of patient's problem, presence/absence of abdominal pain, family history of appendectomy (mother, father, siblings, uncle, aunt, cousin, grandparent) and the number of relatives with a positive family history of appendectomy.

Data were analyzed using descriptive statistics with SPSS version 18. Categorical variables were presented as frequency and relative frequency. Chi-square test was used to test the significant associations between categorical variables. Odds Ratio (OR) and 95% Confidence Interval (CI) were used to measure the degree of association between cases and controls. P-Value of less than 0.05 was considered statistically significant.

Ethical Consideration

Official agreements to perform the research were obtained from College of Medicine – University of Baghdad and Medical City Health Directorates (approval number 1115/23.03.2016).

The aims of the study were explained to each participant and their oral consent was taken.

Results

To predict the association between family history and incidence of acute appendicitis, 100 patients (mean age 27.1±12.6 years), who were diagnosed with acute appendicitis and for whom appendectomy was performed, were compared with 200 patients (mean age 42.4±17.4 years), who were diagnosed with any cause of acute abdominal pain or another abdominal problem except acute appendicitis, among both groups females formed 55%.

Regarding age, two-thirds of the cases (66%) were between 10-29 years compared to only 29% among controls, and the association was statistically significant (χ^2 test=63.9, df=4, P< 0.0001) (***Table 1***). As for family history of appendectomy, ***Table 2*** shows that two thirds (66%) of the cases had a positive family history of appendectomy compared to 31.5% among the controls, and the association was statistically significant (χ^2 = 32.375, df=1, P<0.0001) with 66% sensitivity, 68.5% specificity, a positive predictive value of 51.2%, and a negative predictive value of 80.1%. The patients with positive family history had 4.2 times risk of being a case of acute appendicitis compared to those with negative family history (OR= 4.2, 95%CI: 2.5-7.0, ***Table 2***).

Table 1. Distribution of Cases and Controls by Age Groups* in Years

Ages Groups (years)	Patients with appendicitis (Cases)		Hospital-based patients (Controls)	
	No.	%	No.	%
19-Oct	34	34	10	5
20-29	32	32	48	24
30-39	19	19	39	19.5.0
40-49	8	8	32	16
>50	7	7	71	35.5.0
Total	100	100	200	100

Legend: *Statistically significant association; χ^2 test=63.9, df=4, P< 0.0001, No.=number.

Table 2. Distribution of Family History of Appendectomy within Case and Control Groups.

Family history of appendectomy	Cases		Controls		P value	Odds ratio (95% Confidence Interval)
	No.	%	No.	%		
Positive	66	66	63	31.5		
Negative	34	34	137	68.5	<0.0001	4.221 (2.535-7.030)
Total	100	100	200	100		

Legend: Sensitivity 66%, specificity 68.5%, positive predictive value 51.2%, negative predictive value 80.1%, No.=number.

Then, we divided the control group into two subgroups, a subgroup of 134 out of 200 patients had abdominal pain; in this subgroup 45 of 134 (33.5%) had with a positive family history. The comparison was significant as the (p< 0.0001, OR = 3.8; 95%CI: 2.22 to 6.63) with 66% sensitivity, 66.4% specificity, a positive predictive value of 59.4%, and a negative predictive value of 72.3% (***Table 4***).

The second subgroup of 66 out of 200 patients did not have abdominal pain; in this subgroup, 27.27% were with a positive family history. The comparison was also statistically significant as the (p<0.0001, OR=5.0; 95% CI: 2.56 to 10.03) with 66% sensitivity, 72% specificity, a positive predictive value of 78.5%, and a negative predictive value 58.5%.

After that, case and control groups were divided according to the number of relatives with a positive family history of appendectomy into three subgroups (Negative family history, One member with positive history, More than one member with positive history); comparing those with a negative family history to those having one member with a positive history then to those with more than one member with a

positive history, the results were statistically significant as (p<0.0001, OR=3.4; 95%IC: 1.99 to 5.80, 59% sensitivity, 70.2% specificity, a positive predictive value 45.8%, and a negative predictive value 80.1%; p<0.0001, OR=13.7 ;95%CI:4.72to 39.76, 33.3% sensitivity, 96.5% specificity, a positive predictive value 77.2%, and a negative predictive value 80.1%, respectively. ***Table. 3a, 3b***).

Table 4. Distribution of Family History of Appendectomy and Presence of Abdominal Pain

Family history of appendectomy	Cases		Control subgroup with abdominal pain		P-value	Odds ratio (95% CI*)
	No.	%	No.	%		
Positive	66	66	45	33.5	<0.001	3.839 (2.221-6.637)
Negative	34	34	89	66.5		
Total	100	100	134	100		

Legend: Sensitivity 66%, specificity 66.4%, positive predictive value 59.4%, negative predictive value 72.3%. *CI: Confidence Interval.

Discussion

Appendicitis is one of the most common causes of acute abdomen. In addition, appendectomy is the most commonly performed surgery in the emergency department; despite that, delayed diagnosis and management as well as negative appendectomy along with its complications especially adhesions and its effect on female fertility are still found particularly in limited diagnostic settings. The current study aimed to test the impact of a positive family history of appendicitis on the diagnosis of acute appendicitis. It has found that a positive family history of appendectomy due to appendicitis in those with acute abdominal pain should be considered as an important parameter in the diagnosis as it was associated with three times increased risk compared to those with acute abdominal pain who a had negative family history. Moreover, those having more than one relative with a positive history are 13 times more susceptible to have acute appendicitis in comparison to those with a negative family history.

Initially, patients who presented with appendicitis were 4 times more likely to have a positive family history than those presenting with other diagnoses, whether they did or did not have abdominal pain. In Drescher et al study there was 1.9 times increased risk, which was statistically significant; this difference may be attributable to differences between the two samples in socioeconomic state, which made the population with a relatively lower socioeconomic state or lower hygiene policies less likely to have acute appendicitis unless a stronger familial tendency is found according to the hygiene theory.[6,25] There was a 3.8 times increased risk in those presenting with both acute abdominal pain and positive family history of appendectomy in comparison to those presenting with abdominal pain without a positive family history of appendectomy, a result similar to the study of Ergul et al., with a 3.1 times increased risk while the risk increased by 1.7 times in the study of Drescher et al., which is still statistically significant.[7,25] Another study demonstrated a familial aggregation and a polygenic transmission pattern in a retrospective analysis of families of 80 patients with appendicitis compared to families of matched controls. They found that the relative risk was 10; in other words, the chance of appendicitis was 10 times greater in a child with at least one relative with reported appendectomy, compared to a child with no affected relatives.[21] Gauderer et al., found that children who have appendicitis are twice as likely to have a positive family history of acute appendicitis than those with lower abdominal pain without appendicitis, and 3 times increased risk when compared to controls without abdominal pain.[24] Brender et al., found in their case-control study that parents of patients with appendicitis were approximately 10% more likely to have a positive family history of appendicitis than parents of control children.[26] A Japanese study found that 40% of children in which both parents had acute appendicitis are affected and 20% of children with one parent having acute appendicitis are affected with acute appendicitis.[27] All these studies support the familial tendency of appendicitis, this tendency may be explained by environmental factors such as a specific bacterial infection, certain food habits and genetic difference in resistance to bacterial infections and inflammatory response.[7] Another study, performed by Daniel C., found out that, in a family pedigree that had 16 members with acute appendicitis, 15 cases were with retrocecal appendix. The same conclusion was reached by Shperber et al.[28]

As acute appendicitis is a common disease, 7% of the world's population is at risk of being affected during their life. The presence of one relative with a positive history of appendectomy may be by chance; cases and controls were divided according to the number of the affected relatives (negative family history, one relative with positive family history of appendectomy, more than one relative with positive family history), this had not been taken into account by other researchers, as a result, those presented with abdominal pain and more than one relative with positive history of appendectomy increased suspicion of having acute appendicitis by 13 times, while those presented with abdominal pain and one relative with positive history of appendectomy increase the suspicion by 3 times when compared to those with negative family history.

When only family history was used as a diagnostic test in those with abdominal pain, its sensitivity was 66%, specificity was 66.4%, its positive predictive value was 59.4%, and its negative predictive value was 72.3%, which is consistent with that of Ergul et al., study (The sensitivity was 68.9%, specificity was 75.4%, positive predictive value was 68.9% and negative predictive value was 75.4%). When family history is used as diagnostic test, its sensitivity and specificity are close to those of Alvarado score test (sensitivity 91.5% and specificity 60.5%).[7] It is still uncertain why family history of appendectomy is not used as diagnostic test, especially in the conditions where there are limited facilities.

In contrast to other studies like Drescher et al., study during 2013, in which females formed 46.5% in the cases group and 61.5% in the control group, in this study, the gender was matched, females formed 55% in both groups so that the effect of the gender factor was limited as much as possible (the incidence was slightly more in males than females 1.1-3.1).[2,25]

Regarding age, the mean age was 27.1±12.6 years in the cases group, and 42.4±17.4 years in those who were included as controls. This difference may be attributed to the controls being hospital-based; besides, many were excluded from the control group because of their previous history of appendectomy. In our study, more controls with no previous history of appendectomy were older than the age of the peak incidence of appendicitis; this gives more confidence about those included in the control group as the prevalence of appendicitis decreases with age. The age differences can be seen in other studies like Ergul et al., and Drescher et al., (31% of cases and 20.8% of controls were aged less than 30 years), while in this study, 66% of cases and 29% of controls were less than 30 years.[7,25]

Duration of the study was the only limitation, otherwise the sample size could have been larger. By measuring Alvarado scoring sensitivity and specificity and comparing it to that of family history of acute appendicitis, the groups could be divided into males' and females' subgroups to overcome the slight difference between genders. The small sample size was overcome by choosing case-control as the type of the study, and the cases to control ratio was made 1:2; it is known that each increment in the case to control ratio is associated with an increment in the study power.

Table 3a. Distribution of Cases and Controls by the Number of Relatives with Positive Family History of Appendicitis.

Family history of appendectomy	Cases		Controls		P value	Chi square [Df (1)]	Odds ratio (95% confidence interval)
	No.	%	No.	%			
One member with positive family history	49	59	58	29.74	<0.0001	21.1	3.404 (1.995-5.809)
Negative family history	34	40.96	137	70.25			
Total	83	100	195	100			

Legend: Sensitivity 59%, specificity 70.2%, positive predictive value 45.8%, negative predictive value 80.1%, No=number.

Table 3b. Distribution of Cases and Controls by the Number of Relatives with Positive Family History of Appendicitis.

Family history of appendectomy	Cases		Controls		P value	Chi square [Df (1)]	Odds ratio (95% confidence interval)
	No.	%	No.	%			
More than one member with positive family history	17	33.33	5	3.52	<0.0001	33.021	13.7 (4.720-39.761)
Negative family history	34	66.66	137	96.5			
Total	51	100	142	100			

Legend: Sensitivity 33.3%, specificity 96.5%, positive predictive value 77.2%, negative predictive value 80.1%, No=number, df=degree of freedom

In conclusion, positive family history of appendectomy in patients with acute abdominal pain should be considered as an important parameter in the diagnosis of appendicitis in a limited diagnostic setting as it increases the risk of having appendicitis by three times compared to those with negative family history.

Increasing the number of relatives with positive history of appendectomy is associated with more risk of appendicitis compared to those with one relative with positive history of appendectomy.

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Conflict of Interest Statement & Funding

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Author Contributions

Conception and design the work/idea: TY, ZQ, ZA. Collect data/obtaining results: TY, ZQ, ZA. Analysis and interpretation of data: TY. Write the manuscript: TY, ZQ. Critical revision of the manuscript: TY. Approval of the final version: TY, ZQ, ZA. Statistical advice: TY.

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Original Article

Self-medication among Undergraduate Medical Students of Alexandria Faculty of Medicine: Where do We Stand?

Marwa Ramadan, Asmaa Eltaweel, Tamwe El Nakhal, Hanan Hemead, Abdelrahman Maraqa, Doha Abish, Rana Essam, Azza Baraka.[1]

Abstract

Background: The aim of the present study was to assess the prevalence of self-medication among undergraduate medical students in Alexandria Faculty of Medicine and recognize the patterns and the attitude of students towards intake. **Methods:** A cross-sectional study was conducted among undergraduate medical students attending Alexandria Faculty of Medicine from both national and international programs during the period of June 2013 until October 2013. A self-administrated, semi-constructed questionnaire was used to assess the practice of self-medication among 408 students who were randomly selected using a stratified random sample technique. **Results:** Self-medication was reported by 208 (52.7%) students, with no significant difference between males and females. The highest percentage of self-medication was reported among those who have completed six years of academic study and the lowest was reported among those who have completed two years of academic study. There was a statistically significant association between educational stage (preclinical and clinical) practice of self-medication. Most common medications involved were analgesic and anti-inflammatory followed by decongestants, antimicrobials and antihistaminic drugs. 309 (78.8%) students believed that self-medication is acceptable. **Conclusion:** The present study demonstrated that self-medication is practiced by more than half of undergraduate medical students in the Faculty of Medicine - Alexandria University. Acquiring medical knowledge seems to be associated with the practice of self-medication. Therefore, more attention should be paid to medical curricula to raise awareness and limit the hazardous effects of this phenomenon.

Key Words: Self-Medications; OTC Drugs; Non-Prescription Drugs; Medical Students; Egypt (Source: MeSH-NLM).

Introduction

Self-medication has been defined as the use of medicinal products for treating self–recognized disorders, as well as regular or irregular use of medications prescribed for chronic, recurrent diseases or symptoms. Practically, it may also include the use of medications for treating children or elder family members.[1] There is an international growing concern on how medical personnel deal with their own health problems since it will not only have negative impacts on physicians but also their patients. In addition, self-medication compromises the efficiency of medical system and the delivery of professional medical care.[2-4] Previous research revealed numerous disadvantages of self-medication including pathogen resistance, adverse drug effects, drug dependence as well as economic burden.[5-8]

Self-medication prevalence has been globally discussed in previous studies. In Europe it may reach up to 68%.[9] On the other hand, the prevalence is dramatically higher in developing countries.[10] In Karachi, it is about 76%, and around 92% in Kuwait among adolescents.[11-12] In a recent review, the prevalence of antimicrobial self-medication in the Middle East ranged from 19 % to 82%, reflecting difference in study designs and contextual factors.[13] Self-medication is of particular concern especially in the less developed countries due to the availability of medications with absence of rules and regulations that prohibit such practice.[14-15]

According to the World Health Organization, self-medication could be practiced only in minor troublesome conditions provided that the drug shows acceptable safety and efficacy considering its dose and duration.[1] However, increased costs of medical consultation in developing countries combined with dissatisfaction with medical practitioners has augmented the problem.[16]

Medical students experience great psychological burden due to the nature of their study combined with unrestricted access to pharmaceuticals. These burdens may increase the chance of drug misuse.[17-18] Due to complexity of self-referral and shortage of time, medical students may deal irrationally with their conditions and prefer to use a drug recommended by their colleagues. Studies have reported high prevalence of self-medication among medical students ranging from 57.7% to 76 %.[19-20] There is paucity of research concerning this phenomenon in the Middle East. On the national level, it seems that only two studies were conducted in Ain Shams University and Mansoura universities, with a prevalence of self-medication of 79.9 % and 62.9 % respectively.[21-22] Further studies are required to determine extent and reasons of such practice and whether it was common among medical students in various governorates in Egypt. Therefore, the aim of the present study was to assess the prevalence of self-medication among undergraduate medical students in Alexandria and recognize the patterns and the attitude of students towards intake.

Methods

A cross-sectional study was conducted among undergraduate medical students attending Alexandria Faculty of Medicine from both national and international programs during the period of June 2013 until October 2013. All grades from 1st to 6th year were included in the study. A cross-sectional design was selected since responses were anonymous and it was not feasible to track self-medication patterns in a longitudinal design. The study was approved by the Ethics Committee of Alexandria Faculty of Medicine in May 2012.

A sample size of 360 was estimated using Epi Info 7 with the addition of 15% to account for losses giving a total sample size of 408 students. Sample size was calculated based on 95% confidence interval and a

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prevalence rate of 55% as reported by a previous national study.[21] To ensure the representation of all educational grades, subjects were selected using a stratified random sample of students from the first to the sixth year with proportion allocation. The purpose of the study was explained, and verbal consent was obtained before the distribution of questionnaires. Data were collected using a self-administrated, semi-constructed questionnaire to assess the practice of self-medication as the main outcome variable among the studied participants. The questionnaire included three main sections; the first section involved socio-demographic data as age, gender and educational stage; the second section included questions related to the practice of self-medication, common reasons, medication categories, common illnesses and symptoms involved; and the third section included questions related to participants' opinion towards self-medication, its advantages and disadvantages and the change in the participants' practice while acquiring medical knowledge.

Statistical analysis

Data were analyzed using SPSS version 20, descriptive statistics were estimated for variables as medication categories, reasons behind self-medication and associated illnesses. Chi-square test was used to test the significance of association between the practice of self-medication as the main outcome variable and independent variables as gender, associated symptoms and educational stage.

Results

Out of 408 students, 395 (98.1%) responded to the questionnaire of which 162 (41%) were males and 233 (59%) were females. Table I shows demographic characteristics of participants. Self-medication was reported by 208 students (52.7%) with no significant difference between males and females (p=0.086). Highest proportion of self-medication (67.3%) was reported among those who have completed six years of academic study and the lowest was reported among those who have completed two years of academic study (40.4%). There was a statistically significant association between educational stage (preclinical and clinical) and practice of self-medication (p=0.048).

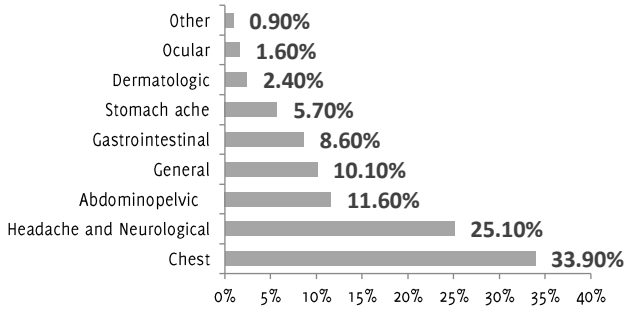
Table 1. Demographic Characteristics of the Studied Sample of Undergraduate Medical Students of Alexandria Faculty of Medicine, Egypt (N=395).

Academic year completed	Number of Respondents	Gender		Nationality		Age (years) Mean ± S.E.
		Male	Female	Egyptian	Other Nationalities	
Fresh students	42	13	40	40	2	18.26±0.08
First Year	89	44	78	78	11	18.91±0.09
Second Year	52	20	50	50	2	19.73±0.10
Third Year	26	17	16	16	10	21.00±0.10
Fourth Year	74	20	71	71	3	21.14±0.13
Fifth Year	60	33	59	59	1	22.03±0.09
Sixth Year	52	15	49	49	3	22.98±0.10
Total	395	162	233	363	32	20.51±0.88

Most common medications involved were analgesic and anti-inflammatory (77% of respondents, n= 304) followed by decongestants (33.4% of respondents, n=132), antimicrobials (33.1%, n=131) and antihistaminic (33% of respondents, n=132).

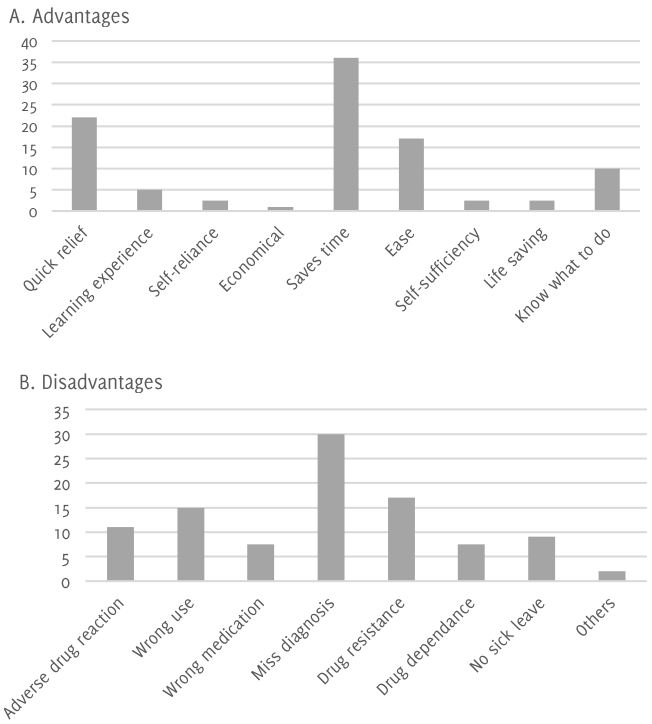
With respect to associated symptoms, self-medication was frequently reported with chest symptoms (78.9% of cases), followed by headache and neurological symptoms (58.4% of cases), abdominopelvic (27% of cases), general symptoms (23.5% of cases), gastrointestinal (20% of cases) with no statistically significant difference between male and female students except for abdominopelvic symptoms (p=0.029). ***Figure 1*** shows distribution of associated symptoms according to frequency of responses.

Figure 1. Symptoms accompanied with Self-medication among the Studied Sample of Undergraduate Medical Students of Alexandria Faculty of Medicine, Egypt.



Self-medication was considered acceptable by 309 students (78.8%). The most commonly reported advantages were: saving time (36.3%), providing quick relief (22.5%) and the ease of use (17.5%) (***Figure 2***). Up to 84% of medical students would continue self-medication for up to one week without improvement in their conditions and only 18 % of students have experienced side effects in association with self-medication. Students believed that the main disadvantages of self-medications are misdiagnosis (30%) and drug resistance (18%) (***Figure 2***).

Figure 2. The (A) Advantages and (B) Disadvantages of Self-Medication Reported by the Studied Sample of Undergraduate Medical Students of Alexandria Faculty of Medicine, Egypt.



Among many factors that contribute to self-medication, the most frequent were: presence of mild illness (52%), previous experience (39%) paucity of time (17%). Only 10% of students reported that there was no change in self-medication practice habits while acquiring medical knowledge while (45%) have become more careful, 27% of students would prefer getting the prescription from a doctor, 25% would discourage self-medication and 23% became afraid of adverse effects.

Discussion

More than half of the studied participants reported self-medication. Such practice increased while acquiring medical knowledge and did not differ according to gender. In addition, analgesic and anti-inflammatory drugs were the most common medication category associated with such practice.

Similar to what has been reported globally, the present study showed that self-medication is widely practiced among medical students (52.7 %). This is similar to what was reported by two national studies: a recent study among university students in Mansoura University reported a prevalence of 62.9%, and another study among medical students in Ain Shams University reported a prevalence of 55 %. [21-22] Our findings are also consistent with what have been described in previous study conducted in India, where the prevalence of self-medication was 57.5%.[23] Another study conducted in Bahrain showed a prevalence of 44.8%, and in Karachi it was as high as 76%.[5-18] There was no statistically significant difference between male and female students (p=0.086) regarding self-medication which is similar to what have been reported in Slovenia, while differs from what have been demonstrated in a previous study in India.[23-24]

Acquiring medical knowledge and clinical skills had a demonstrable effect on practice of self-medication with the highest frequency was reported by senior students who have completed six years of academic study with statistically significant association between educational stage (preclinical and clinical) and practice of self-medication (p=0.048. In Mansoura University, 62 % reported acquiring knowledge made them safer in practicing self-medication.[22] These results are also congruent with study conducted among undergraduate medical students in West Bengal where final-year students practiced self-medication more frequently than first-year students (p-value<0.001).[23-24]

In the present study, self-medication was commonly associated with analgesic and anti-inflammatory drugs (77%) followed by decongestants (33.4%), antimicrobials (33.1%) and antihistaminic (33%). This is consistent with the study conducted in Karachi, where analgesics were the most common (88.3%) followed by antipyretics and antibiotics and the study in Bahrain also reported analgesics to be the most commonly used drug groups (81.3%).[5,20] The frequent use of these drugs for self-medication reflects their availability as over the counter (OTC) medications with absence of rules and regulation that prohibit such practice in the developing countries.[25]

Regarding associated symptoms, chest symptoms (74.2%), followed by headache and neurological symptoms (54.9%), abdominopelvic (25%) were the most frequently reported at Mansoura University where cold was the most frequent symptom (70.1%), and followed by headache (58.9 %), sore throat (35.8%) and intestinal colic (32.2%).[22] In the study conducted in West Bengal, cough/common cold (35.21%) were the most frequent, followed by diarrhea, fever, and headache.[23]

In Bahrain, first year medical students reported headache as the most frequent symptom (70.9%), followed by cough/common cold, stomachache, and fever.[5] There was no gender related difference regarding self-medication associated symptoms except for the abdominopelvic (p=0.029), which may reflect tendency of females to self-medicate for menstrual symptoms.

The majority of students (78.8%) believed that self-medication is acceptable and they rationalized it due to time savings (36.3%), quick relief of symptoms (22.5%) and ease of use (17.5%). Consistently, the national study at Ain Shams University showed that (56.5%) of medical students reported that taking drugs without medical prescription was no problem and another study conducted in India showed that 70% students favored self-medication and the most common disadvantages were time saving (41.2%), followed by convenience (39.6%), quick relief (35.5%) and cost-effectiveness (22.8%).[21,26] In addition, the present study found that 84% may even continue to self-medicate for up to one week without improvement in their conditions. With respect to adverse effects, only 18% of students have experienced side effects in association with self-medication. In addition, students reported that self-medication could lead to are misdiagnosis (30%) and drug resistance (18%). In the study conducted in India, 70.8% of students were aware of adverse reactions of drugs used for self-medication, and 7.6% students had experienced it.[26]

The present study found that presence of mild illness (52%), previous experience (39%) paucity of time (17%) were the most frequent reasons behind self-medication. In Mansoura University, the most frequent cause of self-medication was no need to visit the doctor for minor illness (74%), followed by previous experience and knowledge (71%), and lastly unavailability of health services.[22] The difference the frequency and some causes between this study and Mansoura University may be due to difference in study population since the later involved both medical and non-medical students reflecting a general practice in a university serving a large rural community. Similar findings were reported by undergraduate medical students in a tertiary care medical college in West Bengal, where mild nature of illness was the most common symptom (47.19%) and in Bahrain 45.5% of students preferred self-medication as it is time-saving while 25.4% preferred it due to minor nature of illness.[19,23] 45% of students reported that while acquiring medical knowledge, they became more careful, 27% preferred getting the prescription from a doctor, 25% discouraged self-medication and 23% became afraid of adverse effects, an effect which could be demonstrated by the presence of lowest frequency of self-medication among those who have completed three years of academic study (40.4%) coinciding with studying pharmacology curriculum. The later increase in the tendency towards self-medication among senior students (those who have completed six years of academic study) (63.7%) could be explained by gaining confidence of self-prescription after finishing undergraduate medical education and preparing for their internship. These results are also similar to what have been reported in Bahrain, where senior students practiced self-medication more often and with more confidence.[19]

This study is the first to assess the prevalence of self-medication among undergraduate medical students in Alexandria Faculty of Medicine since data were collected from all six undergraduate years using a stratified random sampling methodology. On the other hand, the main limitation of the present study is the lack of generalizability to represent all undergraduate medical students in Egypt since students enrolled in Alexandria Faculty of Medicine are mainly from four governorates: Alexandria, Behira, Kafr-Elsheikh and Matrouh. Thus, a multi-centric study involving different governorates will be more valuable.

The present study demonstrated that self-medication is widely practiced among undergraduate medical students in Faculty of Medicine - Alexandria University. With the absence of guiding rules and regulations in less developed countries, more attention should be paid to undergraduate medical curricula to raise awareness and limit the hazardous effects of this phenomenon, not only contributing to the health of medical professions, but also their communities.

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Author Contributions

Conception and design of the work/idea: AE. Collection of data/obtaining results: AE, TEN, HH, AM, DA, RE. Analysis and interpretation of data: MR, TEN. Writing of the manuscript: MR, AE, TEN, HH, AM, DA, RE, AB. Critical revision of the manuscript: MR, AE, TEN, HH, AM, DA, RE, AB. Approval of the final version: MR, AE, TEN, HH, AM, DA, RE, AB. Statistical advice: MR. Administrative or technical advice: MR, HH, AB.

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Original Article

HLA-G in Preeclampsia: a Pilot Study to Propose a Tolerogenic Treatment

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Abstract

Background: The serum level of soluble Human Leukocyte Antigen-antigen-D Related (HLA)-(DR) (sHLA-DR) may appear as a useful parameter to monitor maternal immune response during pregnancy. Objective: The aim was to compare HLA-G serum levels in patients with or without preeclampsia. **Methods:** Pregnant women seen at the "Mónica Pretelini Sáenz" Maternal-Perinatal Hospital (HMPMPS) were recruited at their first visit. Two groups were conformed: a) women with healthy pregnancies, and b) women with preeclampsia. The patients' sociodemographic and laboratory data were introduced into the SPSS software program. HLA-G quantification was performed in peripheral blood samples through the Enzyme-linked Immunosorbent Assay (ELISA) method. **Results:** The total number of women seen was 16 (mean age, 24 ± 8 years), eight healthy women (mean age, 22 ± 3 years) and eight women with preeclampsia (mean age, 27 ± 7 years). Women with preeclampsia were older, heavier, had higher levels of Systolic Blood Pressure (SBP), Diastolic Blood Pressure (DBP), Mean Arterial Pressure (MAP), and referred less sexual intercourse per week than healthy pregnant women. There was no difference in HLA-G levels. **Conclusion:** The sexual intercourse frequency is a major factor to develop preeclampsia and the serum HLA-G levels measured previous to the child delivery or cesarean are not different between women with or without preeclampsia.

Key Words: HLA-G; Preeclampsia; Risk Factors; Sexual Intercourse (Source: MeSH-NLM).

Introduction

Preeclampsia is currently a major issue of concern in the field of public health due to high mortality rates and maternal and perinatal morbidity, and this is particularly alarming, as these variables are found among indicators of social inequality. In Mexico, maternal mortality associated with preeclampsia is 5–9 times higher than in high-income countries.[1] It has been hypothesized that the etiology of preeclampsia is based on immunology; thus, prolonged exposure to paternal sperm through sexual intercourse or through exposure to fetal antigens in a previous pregnancy may confer a protective effect.[2] The protective effect of a previous birth is lost when the subsequent pregnancy is conceived with a new partner.[3] Preeclampsia is more common in primiparous women, or in the case of a new sexual partner.[4]

There are several theories that explain preeclamptic etiopathology, in their majority focusing on the placenta as the cause of ischemic disturbances, this due to poor immune adaptation, genetic predisposition, and the secretion of vascular factors that cause morphological changes in the placental endothelium.[5] On the other hand, among the hormonal factors that appear to induce preeclampsia, we find leptin. In fact, our group has reported that leptin levels >40 ng/mL in the second trimester of pregnancy in women with obesity are predictors of preeclampsia.[6]

During pregnancy, the fetus is a semi-allogeneic graft. The mechanisms by which the maternal immune system does not reject the fetus, despite the presence of paternal antigens, is not yet fully understood.[7] Therefore, regulation of maternal immune response appears to be essential for the survival of the fetus. The loss of tolerogenic mechanisms may be involved in the cause of diseases associated with pregnancy, such as preeclampsia, IntraUterine Growth Retardation (IUGR), placenta previa, and the Hemolysis, Elevated Liver enzymes and Low Platelets (HELLP) syndrome. A common event in all of these disorders is inadequate trophoblast invasion of the maternal spiral arteries and poor placental perfusion in early pregnancy.[8]

Although the placenta acts as a barrier between maternal and fetal circulation, there is two-way cell traffic through this barrier. It has been shown that an increased number of fetal cells can be detected in maternal circulation in the case of preeclampsia. Human Leukocyte Antigens (HLA) class I, present on the cell surface of virtually all nucleated cells in the body, present antigenic peptides produced by the cell, which are recognized by cytotoxic T CD8 cells, whereas HLA class II are restricted to B cells, macrophages, dendritic cells, endothelial cells, and Antigen Presenting Cells (APC), which present antigenic peptides that are recognized by T-helper CD4 cells.[9]

Other mechanisms of tolerance induction occur in the fetal-maternal interface. Fetal villous cytotrophoblasts and syncytiotrophoblasts express nonclassical HLA-G and HLA-E, both of which can block the cytotoxicity of maternal Natural Killer (NK) cells.[10] Soluble Human Leukocyte Antigen-G (sHLA-G) is considered essential in pregnancy-associated immune tolerance and in successful implantation, in such a way that, compared to healthy controls, serum levels of sHLA-G is lower in pregnancies complicated by preeclampsia.[11-12]

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Although the etiology of preeclampsia is unknown, a substantial number of studies favor a theory based on a maladapted immune system, with the more specific attributes of low levels of immune regulatory cells and low expression of HLA-G. The aim of this study was to compare the serum levels of HLA-G in patients with or without preeclampsia.[13]

Methods

This was a prospective, clinical and cross-sectional study, developed at the "Mónica Pretelini Sáenz" Maternal-Perinatal Hospital (HMPMPS), Health Institute of the State of Mexico, Toluca, Mexico, from September 2013 to November 2014.

Patients

Pregnant women seen at the HMPMPS were recruited at their first visit. Two groups were conformed: a) women with healthy pregnancies, and b) women that developed preeclampsia. The definition of and criteria for preeclampsia were based on the diagnostic criteria outlined by the American College of Obstetrics and Gynecology (ACOG).[14] The sample was considered at convenience during the year of follow-up. With a standard deviation of 3, alpha risk of 0.0, beta risk of 0.2 and assuming a drop-out rate of 10%, 7 subjects were necessary per group to recognize as statistically significant a difference > 5 units in the HLA-G levels. Women with autoimmune, cardiovascular, and kidney diseases were excluded and those with incomplete medical information were discarded from the final analysis.

Sociodemographic data

All women were asked to respond to a complete medical history, including questions concerning risk factors for developing preeclampsia.

Anthropometry

The nursery staff of both hospitals trained in anthropometry registered the Body weight (BW) and blood pressure. The first was rounded off to the nearest 0.1 kg (Seca 700; Germany) and the second was recorded at each visit with a standard sphygmomanometer (Riester Big Ben®, Germany).

Laboratory tests

When a woman developed preeclampsia or when those with healthy pregnancies began with prodromic uterine contractions, blood samples were collected in Vacutainer™ tubes. Laboratory tests including blood type (A, B, O), albumin (mg/dl), creatinine (mg/dl), glucose (mg/dl), liver function tests (bilirubin, Lactate DeHydrogenase (LDH), ALanine aminoTransferase ((ALT), ASpartate aminoTransferase (AST)) transaminase, urea, uric acid (mg/dl) (Dimension® RXL Max; Dade Behring, Minneapolis, MN, USA), hematological parameters (Advia 120; Bayer Health), 24-h creatinine clearance (ml/min), and proteinuria (mg/24 h) were carried out following International Federation of Clinical Chemistry and Laboratory Medicine (IFCC) criteria. A serum sample for HLA-G determination was stored at -20°C until analysis.

HLA-G

HLA-G concentrations were determined with the Optical Density (OD) value by means of the Enzyme-Linked Immunosorbent Assay (ELISA) method (Abbiotec, cat: 251266) at 490 nm in ELx800™ equipment (BioTek Instruments, Inc., USA), according to a standard (HLA-G 293 cell lysate, ABBIOTEC, cat. no. 409133). This process was conducted blinded at the Research Laboratory of Ciprés Grupo Médico S.C. (CGM), Toluca, Mexico.

Ethics

This study was approved by the Ethics and Research Committees of the HMPMPS (code 217B500402014016) and of the Hospital de la Mujer, Instituto Materno-Infantil del Estado de México (IMIEM) (17/12/2013) and was performed in accordance with the ethical standards laid down in the updated Declaration of Helsinki, Fortaleza, Brazil, 2013. Informed consent was obtained from the patient and guardian if the patient was <18 years of age.

Statistics

Statistical analysis was performed using SPSS ver.17 (SPSS, Inc., Chicago, USA) software. Differences in quantitative variables between the two groups were evaluated by the Mann-Whitney U test. Spearman correlation was used between HLA-G levels and weeks of gestation. The risk of a previous familiar case of preeclampsia was evaluated through the Odds Ratio (OR). A p value of <0.05 was considered statistically significant.

Results

The general characteristics of the patients are depicted in ***Table 1***. Of a total of 25 patients who accepted to participate in the study (11 with preeclampsia and 14 controls), final analysis was carried out with 16 women (mean age, 24 ± 8 years): eight with uncomplicated pregnancies (mean age, 22.2 ± 3.3 years) and eight women with preeclampsia (mean age, 27.4 ± 7.2 years), who complied with all the sociodemographic and laboratory data (***Figure 1***). The decanted patients were due to having been attended as emergencies on weekends without having met the logistics of taking and storing the samples. Interestingly, in the group of cases, four had a direct relative who also suffered from preeclampsia and two patients had preeclampsia in a previous pregnancy. The OR for this last comparison was of 17 (95% CI: 0.7378 to 391.6992, z: 1.770, p = 0.0767).

Table 1. Clinical and Laboratorial Characteristics.

Variable	*Healthy pregnancies*	*Preeclampsia*	*P*
Age (years)	*22.3 ± 3.3*	*27.4 ± 7.2*	*0.032*
BMI (kg/m²)	*26 ± 2.7*	*30.6 ± 6*	*0.032*
DBP (mm Hg)	*69.3 ± 9.2*	*94.2 ± 4.2*	*,0.001*
Cohabitation time (years)	*3.17 ± 3.61*	*2.18 ± 1.89*	*0.727*
Gestational age (weeks)	*38.9 ± 1.5*	*37.4 ± 2.8*	*0.107*
HLA-G (ng/ml)	*78.3 ± 14.3*	*80.3 ± 3.4*	*0.674*
Hto (%)	*38.9 ± 3.1*	*36.2 ± 3.6*	*0.313*
MAP (mm Hg)	*83.1 ± 8.8*	*94.2 ± 4.2*	*0.001*
Pregnancies	*1.86 ± 1.1*	*1.82 ± 1*	*0.977*
SBP (mm Hg)	*110.7 ± 9.2*	*147.1 ± 13.5*	*0.001*
Sexual intercourse/week	*2.5 ± 0.67*	*1.2 ± 0.9*	*0.002*

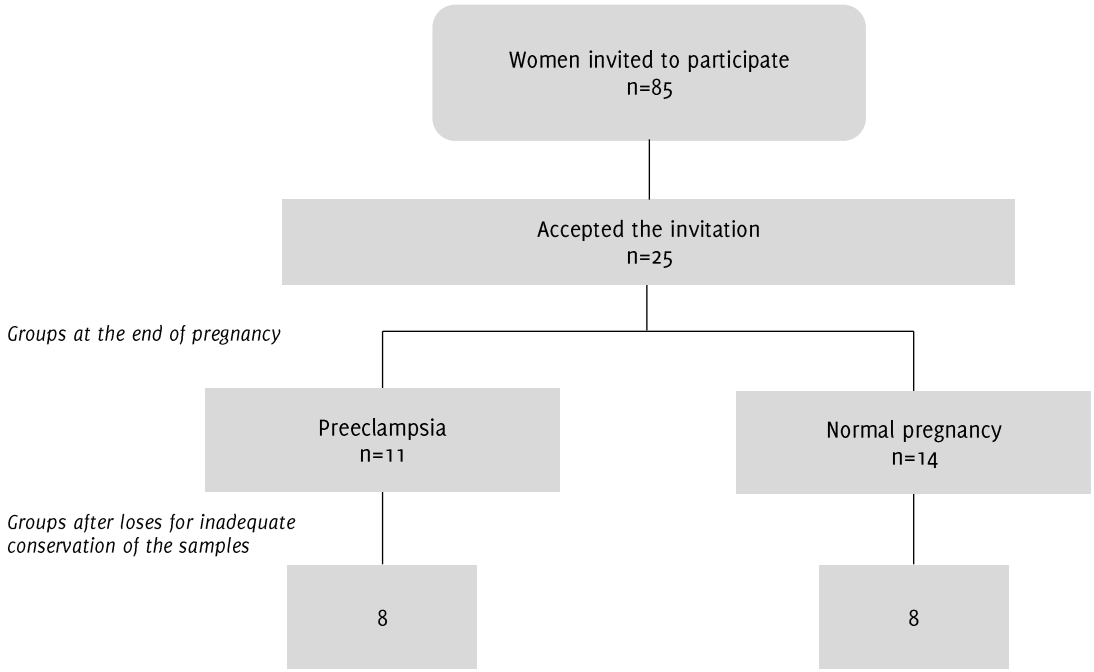
Legend: *a: mean ± SD. BMI: body mass index, DBP: diastolic blood pressure, HLA-G: Human leukocyte antigens class G, Hto: hematocrit, MAP: mean arterial pressure, SBP: systolic blood pressure.*

Sociodemographic Data

Table 2 shows the main social data of the patients. One half of the total population belonged to the Otomí indigenous group. Type of residency in the control as well as in the case group demonstrated the following distribution: inhabitants from an urban area in two cases (25%), semi-urban area in one (12.5%), and from a rural area in five (62.5%) cases.

Cohabitation time did not show significant differences (p = 0.727). In the control group, the source of sexual education derived exclusively from the school in one case (12.5%), one (12.5%) woman did not receive sexual education, one (12.5%) referred another source, and five (62.5%) received a mixture of information from both school and family. In the case group, the source of sexual education was the family in two (25%) cases, a mixture of education from school and family in four (50%) cases, and two (25%) women did not refer any type of sexual education. Sexual intercourse was more frequent in healthy pregnancies than in those complicated by preeclampsia (p , 0.01). Finally, aspirin intake and contraceptive method was confirmed in one (12.5%) woman per group.

Figure 1. Flowchart of the Analyzed Patients.



Anthropometric and Laboratory Data

The expected data that defines preeclampsia (Systolic Blood Pressure (SBP), Diastolic Blood Pressure (DBP), and Mean Arterial Pressure (MBP)) exhibited a statistical difference between both groups, as well as the known risk factors such as Body Mass Index (BMI). Unexpectedly, no difference was detected in the laboratory studies, including HLA-G levels (78.3 ± 14.3 vs 80.3 ± 3.4 ng/mL in healthy pregnancies and preeclamptic women respectively). Even more, by making a comparison of the HLA-G levels between primiparous and multiparous patients there wasn't any difference. By performing a Spearman correlation there was not a significant r between HLA-G and gestational weeks ($r = 0.104$, $p = 0.744$). Ideally, a stratified analysis would be adequate to evaluate the effect of all the variables on the HLA-G levels but it is required to increase the N.

In the group of preeclamptic women, the mean values for creatinine and uric acid were 1.02 ± 0.52 mg/dL and 5.52 ± 1.01 mg/dL respectively. These studies were not processes as a routine in normoevolutive pregnancies.

Discussion

From a general point of view, we have a preeclamptic population similar to that which is very well-known in the clinical setting. The difference in sexual intercourse per week is in line with several publications demonstrating the important role of sexual frequency and its association with the risk of developing preeclampsia.[15-17]

In another line, such as the expression of HLA-primarily limited to gestation, this has given rise to the hypothesis that HLA-G plays an important role in the immunological tolerance of the fetus through the mother. Previous publications have stated that sHLA-G expression in maternal circulation is associated with better pregnancy rates.[18-23] Also, pregnancy success in In Vitro Fertilization (IVF) treatments improves by selecting the fertilized oocytes with the highest sHLA-G-positive culture-medium measurements.[24-25]

Table 2. Sociodemographic Information.

Variable	Healthy pregnancies	Preeclampsia
Education		
No academic studies	2 (25%)	0 (0%)
Primary school	1 (12.5%)	2 (25%)
High school	2 (25%)	4 (50%)
Preparatory school	2 (25%)	2 (25%)
University	1 (12.5%)	0 (0%)
Occupation		
Student	1 (12.5%)	1 (12.5%)
Worker	1 (12.5%)	0 (0%)
Homemakers	6 (75%)	6 (87.5%)
Marital status		
Single	1 (12.5%)	2 (25%)
Marriage	1 (12.5%)	2 (25%)
Common-law	6 (75%)	4 (50%)
Religion		
Jehovah's Witness	1 (12.5%)	0 (0%)
Atheist	1 (12.5%)	0 (0%)
Catholics	6 (75%)	6 (100%)
Income/month (US dollars)		
< 150	7 (87.5%)	6 (75%)
150 - 300	1 (12.5%)	1 (12.5%)
300 - 600	0 (0%)	1 (12.5%)

In our study, contrary to what was expected, there was no statistical difference between women with preeclamptic and healthy pregnancies. It is noteworthy that serum samples have shown to be reproducible in relation to sHLA-G measurements.[26] In the majority of the studies, sHLA-G

has been determined with a commercially available sHLA-G ELISA kit (Exbio Praha, A.S., Vestec, Czech Republic), based on the capture of the MEMG/9 antibody, capturing sHLA-G1/-G5 in association with β2m and a detecting antibody against β2m. Interestingly, the study by Wu et al. who failed to report an association, employed a different ELISA assay, one with a higher limit of detection compared with the Exbio kit.[27] This could account for the differences in the results, whereas there is no obvious explanation for the reported lack of association in the study by Zheng et al., who examined children with atopic asthma and positive controls.[28] In a study conducted by Rizzo et al., sHLA-G1 and HLA-G5 were determined by performing two different ELISA assays: one capturing both sHLA-G1 and HLA-G5, and one capturing only HLA-G5 by the use of the monoclonal antibody (mAb) 5A6G7, which is specific for HLA-G5/-G6.[19] Surprisingly, this showed that women with severe preeclampsia had significantly higher levels of soluble HLA-G5 than women with uncomplicated pregnancies. In the previously mentioned study, there was a trend toward lower sHLA-G1 expression in women with severe preeclampsia.[19]

Based on recent studies, we speculated that HLA-G might be involved in patients with preeclampsia from a Mexican population. This hypothesis was not verified and, although the sample was small, if there was a strong influence of the HLA-G levels in the pathogenesis of preeclampsia, this difference should be evident, such as that of leptin in the case of morbid obesity in the second trimester of pregnancy as a possible predictor for preeclampsia.[6] Our results are in accordance with Biyik but the information that points out the relation of lower HLA-G levels and a higher risk of preeclampsia is also present.[29-30] A very important item to be considered is the putative serum HLA-G variability by trimester and the genetic interaction between the child and the mother.[31-32]

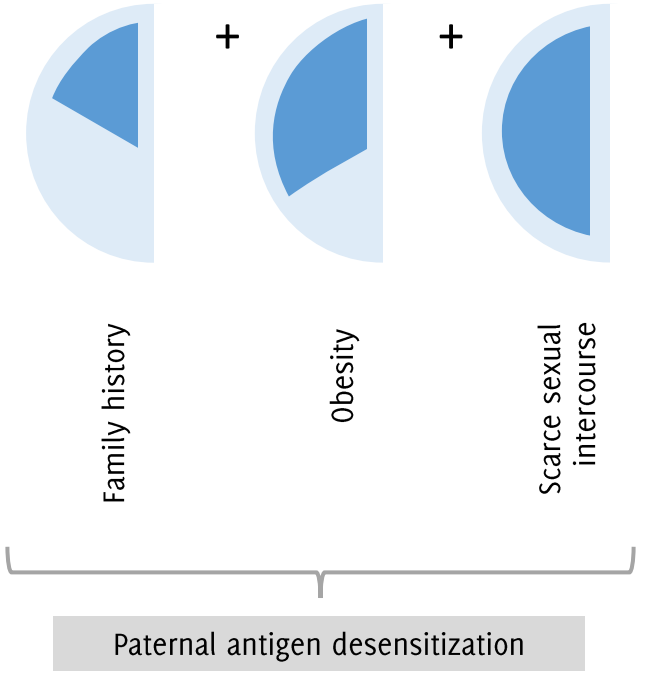
The role of genetics might not be surprising in the effects of HLA-G; for example, polymorphisms in the HLA-G gene and HLA-G expression levels have been linked with reproductive failure and preeclampsia. Several studies have found that the 14 ins allele is associated with decreased levels of sHLA-G in blood plasma, while a few studies found no association.[27-28, 33-34] Furthermore, a recent study even revealed a significant association between HLA-G genotype and the amount of sHLA-G in seminal plasma.[35]

A clear limitation of this study is the low number of patients; this fact reflects the clinical reality in many Gyneco-Obstetrical Hospitals that faces loses in the follow up of risk patients. Additionally, the sHLA-G concentration during pregnancy must be a mixture of contributions from the mother, most probably from maternal immune cells, and from fetal trophoblast cells in the placenta.[36] Besides the small sample size, other limitations are the lack of control of confounders in statistical analysis and the absence of a full immunological panel (HLA of the father and mother, cytokines, etc.) that could contribute to discern the interactions among them and HLA-G. Special mention is the fact that the ideal design must be a cohort, longitudinal study, to perform several quantifications of HLA-G, cytokines, etc.

From our results, the main risk factor for preeclampsia is the frequency of sexual intercourse. Although the antecedent of a previous woman affected in the family of the patient was near to reach statistical significance. Thus, a screening flowchart and a preventive treatment could be designed. First, the characterization of the immunological status including inflammatory cytokines of a woman at high risk of preeclampsia since the beginning of pregnancy might be a good maternal health target.

Due to the inadmissible worldwide maternal mortality caused by preeclampsia/eclampsia, we propose a new treatment aimed at the tolerance for paternal antigens in patients at risk (obesity, preeclampsia in a previous pregnancy, primiparous women and those with low sexual intercourse (e. g. in cases when the father is a worker that migrates to another Country) (***Figure 2***). First, from a sample of paternal peripheral blood, the leukocytes should be separated and subjected to a freeze-drying process. After standardization of the number of cells by extraction and its corresponding amount of RNA the pellet would be diluted in saline solution. Second, periodical subcutaneous injections should be administered to the mother at high risk of preeclampsia.

Figure 2. Candidate Pregnant Woman for a Paternal Immunotolerance Scheme.



This is clear from this general idea the impossibility to know a priori the quantity (µL) of solution to elute the sample preserving the antigenic properties, neither the doses to administer subcutaneously nor the period of time to do it but following a Taguchi method approach the standardization process could be reached.[37] Notwithstanding some ethical considerations should be taken into account, as the possibility to be immersed in paternal discrepancies.

Our results can be summarized as follows: family history of preeclampsia and the frequency of sexual intercourse are high-risk factors to develop preeclampsia. This reinforces the notion of a genetic background and the possibility to modify through an immunotolerance phenomenon the non-desired evolution. Future research questions must find the genes of the preeclampsia inheritance.

Any maternal death is a catastrophic event leading to orphaned children, family disintegration and social weakness. It is urgent the need to have an affordable and efficacious preventive treatment, but we can start with the design of a Preeclampsia Risk Scale that includes and assigns different points to the pre-pregnancy Body Mass Index (BMI), frequency of sexual intercourse, interleukin levels, familial cases of preeclampsia, etc.

Finally, we believe that a grant call from the World Health Organization (WHO) or from one or more high-income countries aimed at the reduction of the cases of preeclampsia based on the immune response could make a big difference in the maternal mortality.

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Author Contributions

Conception and design the work/idea: HMZ. Collect data / obtaining results: CLG, CALG, ASAB, CFLT, DJAR. Analysis and interpretation of data, Approval of the final version: CLG, CALG, ASAB, MSCR, CFLT, DJAR, HMZ. Write the manuscript: CLG, CALG, ASAB, MSCR, CFLT, HMZ. Critical revision of the manuscript: MSCR, HMZ. Obtaining financing: MSCR, HMZ. Statistical advice: HMZ. Administrative or technical advice: CFLT, DJAR.

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Original Article

Cardiovascular Risk Factors and Diabetes in Medical Students: Observational Study, Experience in Colombia

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Abstract

Background: Cardiovascular Disease is a leading cause of preventable death. Cardiovascular risk factors' identification is the cornerstone for effective and early interventions decreasing the frequency of acute health-threatening events. Since adolescence and youth are very vulnerable stages to develop risky habits, we decided to run this study in the Multidisciplinary Universitary Camp for Research and Service. **Methods:** A descriptive cross-sectional study was performed in the Multidisciplinary Universitary Camp for Research and Service in which 450 medical students from Colombia were assessed. After a probabilistic random simple sampling (n=50), we applied the World Health Organization test and Finnish Risk Score to calculate Cardiovascular and Diabetes Mellitus risk, respectively. We characterized the population by sociodemographic variables and anthropometric measurements. **Results:** The study shows that from 18 participating universities (n=50), the mean age of the participants was 21.14 years (SD 7.3) of whom 40% were male and 60% were female. Overall, 92% have a low risk of cardiovascular disease, 6% are at moderate risk and 2% are at high risk. 92% have low risk of diabetes mellitus and 8% are at moderate risk of having diabetes mellitus in the long term. **Conclusion:** The early identification of and intervention on risk factors could decrease significantly the onset of acute health-threatening cardiovascular pathologies. As medical students, adolescents and young adults are at risk of developing unhealthy habits which increase the incidence of cardiovascular disorders. The use of anthropometric measures and validated risk score scales is an appropriate way to get evidence for starting early interventions.

Key Words: Risk Factor, Cardiovascular Diseases, Diabetes Mellitus, Medical Students (Source: MeSH-NLM).

Introduction

Worldwide, Cardiovascular Diseases (CVD) have been considered public health problems since they are the first cause of death and disability.[1-2] This group of diseases includes disorders of the heart and blood vessels, including coronary heart disease, stroke, peripheral arteriopathy, rheumatic cardiopathy, infectious cardiac disease, congenital cardiopathy, deep vein thrombosis, pulmonary thromboembolism etc.[3-4]

Epidemiological reports indicate an estimate of 17.5 million CVD-related deaths in 2012, accounting for 31% of all deaths registered in the world. Of these, 7.4 million were due to coronary heart disease and 6.7 million to stroke. More than three-quarters of CVD deaths were in low and middle-income countries.[3] In Colombia, cardiac ischemic disease in the last decade has been the leading cause of death in people over 55 years of age, above cancer and assaults, according to the National Administrative Statistics Department (DANE).[5] For the 2000-2010 period, cardiovascular mortality in men was 136/100.000 people, while in women it was 125/100.000 people.[6]

The etiology of CVD is multiple, complex, with an early development, and their evolution is related to the presence of Cardiovascular Risk Factors (CVRF).[7] A risk factor is any attribute which alters the frequency of occurrence of an event. Currently, CVD risk factors are classified in modifiable and non-modifiable. The first ones are those that can be changed, either by improving lifestyle or using pharmacological interventions. Meanwhile, non-modifiable are those which are not susceptible to change, for example age, gender, and inheritance.[3] The World Health Organization (WHO) considers smoking, sedentary lifestyle, diet, diabetes mellitus, dyslipidemia, arterial hypertension (HT) as main and modifiable risk factors.[3,7] There is evidence which supports that smoking cessation, reduced dietary salt intake, fruits and vegetables consumption, regular physical activity and avoidance of harmful alcohol consumption reduces the risk of CVD.[3]

Besides, there are also some underlying determinants of chronic diseases that are "the causes of the causes" which reflect on the forces which determine social, economic and cultural changes: globalization, urbanization and aging of population. Other determinants to develop stroke are poverty, stress and hereditary factors.[8-10]

Early cardiovascular events refer to any events which occur before or during the fifth decade of life in men and the sixth decade of life in women. However, initial atherosclerotic lesions leading to clinical events commence much earlier. These can be evidenced during the second decade of life when Cardiovascular Risk Factors can be detected, especially metabolic ones like dyslipidemia or obesity.[11-12]

Adolescents and young adults are very vulnerable to develop dangerous habits, such as alcoholism, smoking, drug addiction and risky sexual practices. One should be concerned about the health of this population, since students are a young population not enough studied. In general, some diseases generally develop later in their lives, not during young adulthood.[13-14] The Multidisciplinary Universitary Camp for Research and Service (CUMIS) is a national event coordinated by the Association of Scientific Societies of Medical Students of Colombia (ASCEMCOL), where medical students from each Colombian faculty can meet with the goal to provide healthcare to their selected community.[15]

The population of medical students presents certain characteristics that are relevant and explain why this population should be included in studies. An investigation developed in health sciences students of the

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University of the Andes pointed out that the general prevalence of stress was 36.3%, medical student having higher levels of stress compared to other careers.[16] At the Military University of Colombia, a study was conducted on medical students to identify the prevalence of depressive symptoms: the global prevalence was 53.2%, and 26.1% of students had mild depressive symptoms, whereas 5.4% had a severe symptomatology.[17] Both stress and depression, among other psychosocial factors, are considered precipitating factors and are said to decrease the quality of life and survival in relation to noncommunicable chronic diseases.[18]

In studies at universities in Latin American countries near Colombia, it has been described that this population has special characteristics that should be studied more thoroughly. At the University of Valparaíso of Chile, it was found that the most prevalent risk factor for the development of chronic noncommunicable diseases (prevalence: 88%) is physical inactivity; overweight and obesity had a prevalence of 31.8%, being higher in men than in women, and smoking with a prevalence of 23.6%, thus concluding that the prevalence of the risk factors studied is high.[19] In the University of Carabobo of Venezuela, the most frequent risk factor was sedentary lifestyle (72.49%), followed by alcohol consumption habits (68.3%) and smoking habits (34.16%); 37.5% had high consumption of oils and fats, 58.3% of starches and sugars, and, in addition, 33.34% of participants were overweight or obese, 3,33% presented hypertension and metabolic syndrome. The predominant family history was for hypertension (60%) and obesity (28.2%), and thus a similar conclusion to the previous research was drawn.[18]

The final goal of this work was to identify the presence of cardiovascular risk factors in Medicine Students who attended the CUMIS event, to know and identify the national reality in this population group, and then develop long term strategies which would allow us to decrease the incidence of cardiovascular diseases and early deaths.

Methods

We conducted a cross-sectional descriptive study which included the total population of medical students who attended the CUMIS (n=450). We obtained a probabilistic random simple sampling of students (n=50) from different medicine faculties from Colombia, who accepted to take 2 instruments of data recollection, the first one developed by WHO and the International Society of Hypertension (WHO/ISH) to calculate cardiovascular risk, the second one the Finnish Risk Score to calculate the risk of Diabetes Mellitus.[19]

Sociodemographic variables, such as age, gender and university, and clinical variables such as weight, height, body mass index (BMI), systolic and diastolic blood pressure, pathological background as diabetes mellitus or tobacco consumption, were also collected.

We recollected the data during activity breaks in CUMIS. We applied the instrument to people who met the inclusion criteria, which were: to be a medical student enrolled in a Colombian faculty, to be a CUMIS assistant, and to accept to participate in the study. Exclusion criteria were: not being a medicine student and not accepting to participate in the study. Study variables were deposited in a spreadsheet of Microsoft Excel 2016® and analyzed in the statistical program Epi Info 7®.

This study is considered a "risk-free research", according to Resolution No. 008430 of 1993 of the Ministry of Health of Colombia, which establishes the scientific, technical and administrative standards for health research. The study was approved by the organizers of the CUMIS and the Permanent Committee of Evaluation and Scientific Development of the ASCEMCOL.

Results

The study included 50 medical students from different Colombian universities who attended the Multidisciplinary Universitary Camp for Research and Service (CUMIS). The mean age of the participants was 21.14 (Standard Deviation [SD]: 7.3 years, 95% CI: 19.1-23.1 years). The gender distribution was 40% males (n = 20) and 60% females (n = 30). The distribution by university is shown in ***Table 1***.

Table 1. Distribution of the Population Studied by Each Participating University.

University	n	%
University of Tolima	4	8
Alexander Von Humboldt University	9	18
University of Caldas	5	10
University of Valle	2	4
Cooperativa de Colombia University - Villavicencio	1	2
Cooperativa de Colombia University – Medellín	1	2
Central del Valle University	5	10
University of Quindio	1	2
Fundación Universitaria Autónoma de las Americas	5	10
Industrial de Santander University	1	2
University of Sinu	1	2
Militar Nueva Granada University	4	8
University of Antioquia	1	2
Antonio Nariño University	1	2
ICESI University	6	12
Pontificia Universidad Javeriana	1	2
Tecnológica de Pereira University	1	2
University of Manizales	1	2

All the students were weighted, finding an average weight of 64.9 kg (SD: 11.8 kg) and height was measured, with an average of 1.69 m (SD: 0.08 m). The Body Mass Index (BMI) was calculated: 44 students (88%) had a BMI between 18 and 25 kg/m^2, 5 (10%) of them had a BMI greater than 25 kg/m^2 and only 1 (2%) student had a BMI of less than 18 kg/m^2.

Of the evaluated population, none had a history of diabetes and only 10% (n = 5) reported being smokers. Based on age, gender, history of diabetes, cigarette consumption and systolic and diastolic blood pressure, we calculated cardiovascular risk as shown in ***Table 2***.

Table 2. Classification of Population in the Different Risk Levels Proposed by WHO/ISH Risk Prediction Charts and their Recommendation by Percentage and Frequency.

Risk levels	n (%)	Recommendation
Low risk (risk less than 10%)	46 (92%)	-
Moderate risk (risk between 10% and 20%)	3 (6%)	Monitor the risk profile every year and guide to assume habits and healthy lifestyles
High risk (risk between 20% and 30%)	1 (2%)	Monitor the risk profile every 6 months and guide to assume habits and healthy lifestyles
Very high risk (risk between 30% and 40%)	0	Monitor the risk profile every 3 months and guide to assume habits and healthy lifestyles
Extremely high risk (risk >= 40%)	0	Monitor the risk profile every 3 months and guide to assume habits and healthy lifestyles

Legend: The calculated risk of the participant indicates the 10-year risk of combined myocardial infarction and stroke (fatal and non-fatal).

Based on 8 questions that included age, waist circumference measured below the rib in cm, BMI, daily physical activity of at least 30 minutes, frequency of consumption of vegetables, consumption of medication for arterial hypertension, findings of high glucose levels on routine

visits to the doctor and if they have a history of diabetes in their family, the risk for diabetes was calculated as shown in ***Table 3***.

Table 3. Classification of Population in the Different Risk Levels Proposed by Finnish Diabetes Risk Score and Their Recommendation by Percentage and Frequency.

Diabetes risk	n (%)	Recommendations
High risk (>12 points)	0	Suggested to perform an oral glucose tolerance test and change lifestyle habits to improve your health
Medium risk 10- 12 points	4 (8%)	Suggested to increase physical activity, to improve their eating habits and pay attention to their weight, to prevent the development of diabetes, changes in lifestyle can completely prevent diabetes or at least delay its onset until very advanced ages
Low risk <10 points	46 (92%)	Suggested that you control your weight regularly, consume fruits and vegetables daily and practice at least 30 minutes of moderate intensity physical activity per day to maintain or improve your health

Legend: High Risk (> 12 points) means a high risk of developing prediabetes or diabetes in the next 10 years. Moderate risk (10-12 points), moderate risk of developing prediabetes or diabetes in the next 10 years. Low Risk (<10 points), low risk of developing prediabetes or diabetes in the next 10 years.

Discussion

CVD are entities which are the results of different risk factors which begin at the time of birth and end at the moment when the acute pathology is triggered.[20] This is why they are the first cause of death in Colombia.[21] The evaluation of these factors from an early age and their correction is the way to reduce these pathologies.[22-24]

A study conducted in young university students of Santa Fe locality in Bogota, Colombia reported as main risk factors for cardiovascular disease alcohol consumption, smoking and physical inactivity.[25] Those risk factors should be the cornerstone for an effective and early intervention and improvement the quality of life.

According to the results of this study, five people were active smokers with a prevalence of 10%. This prevalence is lower compared to some studies conducted in Colombia between 2010 and 2015 which report a prevalence of 15% in University of Pamplona, 22% in a private university in Manizales city, University of Cartagena 24%.[26-28] Also, the National Study of Psychoactive Use 2013 reported a national prevalence of smoking of 16% in people between 18 and 32 years old.[29] Some studies in Latin America and North America report a prevalence of smoking in university students of 43% in Peru, 33% Chile, USA 35%.[30-32]

Obesity and overweight is an important risk factor to develop CVD. The measure of BMI is an appropriate, cheap and easy tool to make a diagnosis of weight alterations. This study revealed that 5 people (10%) have a BMI >25. This result is lower compared to some studies conducted in university students which report a BMI > 25 prevalence of 26.47% in a private university in Bucaramanga, University of Pamplona 17.3%, and a prevalence in other countries as Chile of 30%.[31,33] The relationship between gender, smoking, and BMI >25 was not similar compared to the national epidemiology, or some other studies in Colombia.[26-28]

We did not find studies evaluating those risk factors specifically in medical students in Colombia. However, according to a study carried out in Chile in 2014 in which medical, educational and engineering students were evaluated, BMI > 25 prevalence in third year medical students is 36.2%, physical inactivity 60.3%, smoking 15.5% and alcohol consumption 70.7%.[31] BMI and smoking prevalence in our study is lower compared to this study. Medical students and physicians need to know about this very high prevalence of modifiable risk factors and make an early intervention to adopt healthy lifestyles and reduce the incidence of important diseases.

In our study, students coming from 18 universities from all over the country were enrolled. We could observe that although the great majority of the population (92%) has a low risk of cardiovascular disease and diabetes mellitus (92%), 6% are at moderate risk and 2% are at high risk, and 8% are at moderate risk of having diabetes mellitus in the long term. The relationship between gender was not maintained in relation to national epidemiology, since it was the female sex that had the highest BMI (31.7 kg/m2), as well as risk factors such as smoking (3 out of 5 students who were smokers).[6] These two pathologies go hand in hand and so does their prevention.[34-35]

It is important to clarify that although a university population of medical students from all over Colombia has been taken, we still need to develop more research that will allow us to include the outcomes of unaddressed risk factors and how they influence the development of these pathologies. We must also relate to the different university careers that are taught in a university and evaluate the relationship between these and the development of a chronic disease. Additionally, there could be a selection bias since the population in our study is not older than 25 years old; however, the instrument to calculate the cardiovascular risk has a minimum age limit of 40 years and the population of study are university students, thus this bias was not considered relevant by the researchers.

Cardiovascular diseases and diabetes mellitus are increasing, and this is where future health professionals must intervene to improve the quality of life of their patients. As we observed in our study, cardiovascular risk factors and diabetes mellitus have characteristics that can be modifiable, and it is worrying that every day they appear in a younger population, an argument that makes us aware that the only way to preserve a healthy life is with prevention and development of public health strategies that allow us to generate a definitive impact on populations to reduce the incidence and early deaths caused by these pathologies.

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Author Contributions

Conception and design the work/idea: DMBE. Collect data / obtaining results, Analysis and interpretation of data, Write the manuscript, Critical revision of the manuscript, Approval of the final version, Contribution of patients or study material, Obtaining financing, Statistical advice, Administrative or technical advice: DMBE, KVLO, JEYR.

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Original Article

Prevalence of Impostor Phenomenon among Medical Students in a Malaysian Private Medical School

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Abstract

Background: Impostor phenomenon is described as an "internal experience of intellectual fraudulence" among high achievers, which include medical students who often doubt their ability to become good doctors in the future. This study sought to determine the prevalence of impostor phenomenon among medical students and how impostorism is correlated with other psychological distresses namely anxiety, depression and low self-esteem. **Methods:** To conduct this cross-sectional study, various scales were distributed to all 4th-year medical students in Melaka-Manipal Medical College (MMMC), Muar campus to measure impostorism, depression, anxiety and self-esteem. Clance Impostor Phenomenon Scale (CIPS) was used to measure impostorism and a score of 62 was set as the cut off value to classify a participant as an "imposter". **Results:** Out of 300, 256 (85.3%) students completed the questionnaires. 48% and 44% of male and female students respectively scored as 'impostors' with no significant difference between the two genders. Positive correlations were noted between impostor phenomenon with low self-esteem (rho=0.56), depression (rho=0.42) and anxiety (rho=0.41). Impostors significantly have stronger intentions of quitting medical school ($p < 0.001$) and felt that they were not ready to cope with challenges during housemanship ($p < 0.05$). **Conclusion:** Impostors suffer greatly from psychological distress. They are not confident to face the future challenges of housemanship and have stronger intentions of quitting the course. It is necessary for medical colleges to acknowledge this feeling and help the students to cope with it to ensure a smooth transition from medical school to housemanship period.

Key Words: Prevalence; Stress, Psychological; Students, Medical; Depression; Anxiety (Source: MeSH-NLM)

Introduction

Impostor Phenomenon (IP) was first observed in a clinical setting by Clance and Imes in 1978 among high achieving women who do not experience an internal sense of success.[1] Matthews and Clance defined (IP) as an "internal experience of intellectual phoniness" among high achievers.[2] Being in a community of high achievers, those in the medical field tend to more commonly experience IP. A study done in Ontario found that 43.8% of internal medicine residents have IP while another study in Wisconsin (2004) involving family medicine residents found that 41% of women and 24% of men experience IP.[3-4]

A few studies have shown that females have a higher risk of developing IP.[1, 5-6] Meanwhile, another study found the opposite result where Impostor score was higher in male academicians.[7] However, another study found no significant difference in IP between both genders.[8] Other studies have shown that there are significant differences in IP among ethnic minorities in the USA.[9-10] Hence, a similar study to see if there are differences in IP among various ethnic groups in Malaysia is much needed. Although various studies have been done to study the link between social class and psychological distress, [11-13] data regarding relationship between social class and IP is very scarce.

Several studies have found that IP is correlated with depressive symptoms.[4,14] Family physician who have high impostor traits were found to be also having high depressive symptoms.[4] In the literature, results regarding the relationship between IP with anxiety and self-esteem are showing conflicting findings. While one study found that anxiety is strongly correlated with IP, another study found no connection between IP and anxiety.[4,14] Another study meanwhile reported no relationship between self-esteem and IP.[15] However, another study found negative correlation between self-esteem and Impostor score.[16] 75% of family medicine residents with IP were also found to be worried that they will "not be ready to practice full-range family medicine" after graduation.[4] In view of all these findings, the relationship between IP among medical students and their confidence level to cope with challenges during housemanship and specialization needs to be assessed.

A study involving American medical students in a medical school in Jefferson showed that IP was found to be significantly associated with indices of burnout namely exhaustion, cynicism, emotional exhaustion and depersonalization.[35] Impostor phenomenon also can have dire implications on learning process of a medical student. Those with high impostor traits are less likely to express the views or volunteer answers and information as compared to their non-impostor peers. This may then lead to differences in style of learning which may require a tailored curriculum to take into account the huge number of medical students with high impostor traits. [35] These students also are more likely to avoid challenges and even decline many learning opportunities in fear of making mistakes.[39] In healthcare meanwhile, impostorism can have various negative outcomes including a poor reflection of the institution via the individual's actions.[40]

This study aims to: (1) find out the prevalence of impostor phenomenon among medical students in a Malaysian medical school, (2) assess the factors contributing to impostor phenomenon, (3) assess the correlations between impostor phenomenon and the mental health of medical students and (4) determine the confidence level of medical students in facing challenges during their housemanship (internship period upon graduating from medical school). We hypothesized that the prevalence of IP among medical students to be high and it will have great impact on the mental health of the students. Findings of this study are vital in order to manage and reduce the psychological distress among the students.

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Methods

Study Design and Instruments

In order to attain our objectives for this study, we chose quantitative analytical cross-sectional study and we utilized questionnaire method to gather the data. The study was conducted from September 2015 to December 2015 and the study sample involved fourth year medical students of Melaka-Manipal Medical College (Muar Campus), Johor, Malaysia. Based on our calculation with 95% confidence level and a margin error of 5%, a sample size of 193 was calculated using Epi Info 7 software. A universal sampling method was used to collect the data. The questionnaires were distributed in person to the respondents. The main questionnaire that was used in this study included two sections; Section A and Section B. Section A elicited the respondents' demographic data and other related information while Section B consisted of 5 scales to measure levels of impostorism, self-esteem, anxiety and depression. This study was approved by the Research Ethic Committee of Faculty of Community Medicine MMMC, and all the participants signed a written informed consent form with assurance of confidentiality.

Demographic Questions And Other Related Information

Demographic data that were asked include; gender, age, ethnicity, religion, socioeconomic status, and if they have any close relatives who are doctors. They were also asked about their level of confidence to face housemanship, and if they had any thoughts of quitting this course in the past 3 months.

Clance Impostor Phenomenon Scale

There are few scales available to measure impostorism. The two most widely used scale is the Harvey Impostor Phenomenon Scale and Clance Impostor Phenomenon Scale (CIPS). CIPS was chosen because it was found to be more sensitive and reliable.[17] The internally reliable and validated CIPS consists of 20 items that can be scored on a scale of one to five.[17-18] Clance and Imes developed this scale to measure the level of impostorism and a cut off value of 62 had been used widely in all other researches as the cutoff point to classify someone as an impostor. Hence, this cut off value was also used in our study.[19-20]

Rosenberg's Self-esteem Scale

To measure the level of self-esteem, we used the most common measure of self-esteem which is the Rosenberg's Self Esteem Scale which has internal consistency coefficients of 0.89.[21] This scale was chosen because it is found to be suitable for assessment of self-esteem among higher education students.[36]

Beck's Anxiety Inventory

Beck's Anxiety Inventory which is internally reliable and had been validated was used to measure if a person is having anxiety.[22] The scale was found to show acceptable psychometric properties among adolescents.[37]

PHQ-9

Depression was measured using Patient Health Questionnaire (PHQ)-9 which assesses the 9 depression symptoms based on DSM-V and is a reliable and valid measure of depression.[23] Research has shown that PHQ-9 is a valid and reliable scale to screen depression among college students.[38]

Statistical Analysis

The statistical analysis of data was conducted using Epi Info 7 software. Participants' demographics were described by frequency. Gender differences in impostor, depression, anxiety, and self-esteem were compared using mean scores. Chi-square tests of association and relative odds were used to explore the association between categorized variables. Pearson Product Moment correlations (rho) were used to estimate bivariate relationships between raw instrument scores. Ninety-five percent confidence intervals were used in estimating the correlations and relative odds.

Results

Participants Demographics

Of the 300 surveys sent out, 256 completed forms were returned for a response rate of 85%. ***Table 1*** shows the distribution of respondents in this survey conducted in Melaka-Manipal Medical College, Muar Campus. Majority of the respondents were female with 60.9% and students of Malay ethnicity predominated at 43.36%. Most of the respondents also had relationship status of 'single' at 77.73%. Students from middle income families were the majority at 51.95% and those who were studying on scholarship at 59.38%. 149 (58.2%) respondents reported that they do not have any close relatives currently working as doctors.

Table 1. Demographic data of respondents.

PARAMETERS	NUMBERS (%) N=256
Gender	
Female	156 (60.9)
Male	100 (39.1)
Race	
Malay	111 (43.36)
Chinese	67 (26.17)
Indian	65 (25.39)
Others	13 (5.08)
Religion	
Islam	118 (46.09)
Hindu	53 (20.7)
Buddhist	50 (19.53)
Christian	29 (11.33)
Others	6 (2.34)
Birth order	
First	56 (33.73)
Middle	74 (44.57)
Last	36 (21.69)
Relationship status	
Single	199 (77.73)
Couple	57 (22.27)
Socioeconomic status	
Low income	64 (25.0)
Middle income	133 (51.95)
High income	59 (23.05)
On scholarship	
Yes	152 (59.38)
No	104 (40.62)
Having close relative as a doctor	
Yes	107 (41.8)
No	149 (58.2)

Gender Difference

Table 2 displays the gender differences between males and females in the mean impostor score, percentage of impostors, as well as mean depression, anxiety and self-esteem scores. 45.7% of respondents scored as impostors with no significant gender difference between males who scored as impostors (48.0%) and females (44.23%). The mean impostor score for females was 60.3 and male was 62.4 ($p = 0.14$). The mean depression, anxiety and self-esteem scores between males and females also showed no statistically significant differences ($p > 0.05$).

Table 2: Gender differences in the responses among respondents.

Statistic	Men	Women	p-value
Mean impostor score	62.4	60.3	0.14
Percent impostors	48.00%	44.23%	0.55
Mean depression score	6.36	6.75	0.56
Mean anxiety score	10.17	12.26	0.12
Mean self-esteem score	17.7	18.8	0.07

Impostorism

Table 3 shows the association between various factors and impostor phenomenon. The factors were gender, race, relationship status, having a close relative as a doctor, socioeconomic status, whether receiving scholarship or not, and whether they joined the medical course by personal choice or not. Results showed that none of these parameters have any association with impostorism.

Association of Impostorism with Depression, Anxiety, and Self-esteem

Impostor scores were also correlated with anxiety symptoms (rho = 0.41, $p < 0.0001$) and with depressive symptoms (rho = 0.42, $p < 0.0001$). Those who obtained high impostor scores also had the lowest scores for self-esteem (rho = 0.56, $p < 0.0001$). Using depression, anxiety, and self-esteem scores, multivariate analysis was performed to predict impostor phenomenon. The outcome showed statistically significant results in which depression, anxiety and self-esteem are able to predict the impostor phenomenon as shown in *Table 4*.

Impostorism and Housemanship

Table 5 depicts the Chi square analysis which was done to determine: 1) If being impostors have an association with the students' readiness to cope with the challenges during their internship years; 2) If impostors have high tendency to have the feeling of quitting the medical course; and 3) If they are confident of becoming a medical specialist in the future. The results significantly showed that impostors felt they are not ready to face challenges during their internship years ($p < 0.05$, Odds Ratio = 5.16, $X2 = 4.84$) as well as having the feeling of quitting the medical course ($p < 0.001$, Odds Ratio = 1.98, $X2 = 11.39$) as compared to non-impostors. However, there is no significant difference between impostors and non-impostors in their confidence level to become a specialist in the future.

Discussion

The main aim of this study is to find the prevalence of IP among the students of a Malaysian medical school and it was found that 45.7% of medical students are impostors. This means that two out of five medical students have chronic feelings of self-doubt and fear of being discovered as an intellectual fraud. Those who have high impostor scores also tend to have high anxiety and depression scores, as well as low self-esteem scores, indicating that these are interrelated. Impostors also have lower confidence to face future challenges as a House Officer during housemanship and have a higher tendency to feel that they should quit the medical course. Gender, ethnicity and socioeconomic status did not influence impostorism in this study.

Table 3: Association between various factors and impostor phenomenon

Characteristic	Impostor n (%)	Normal n (%)	Adjusted odds ratio (95%CI)	p-value	X^2
Gender					
Male	48 (48.0)	52 (52.0)	1.16 (0.70-1.93)	0.644	0.21
Female	69 (44.2)	87 (55.8)	1		
Race					
Chinese	28 (41.79)	39 (58.21)	1		
Malay	54 (48.65)	57 (51.35)	1.32 (0.71-2.43)	0.46	0.54
Indian	27 (41.54)	38 (58.64)	0.99 (0.5-1.97)	0.88	0.02
Others	8 (61.54)	5 (38.46)	2.22 (0.66-7.54)	0.31	1.01
Relationship Status					
Couple	23 (40.35)	34 (59.65)	1		
Single	94 (47.24)	105 (52.76)	0.76 (0.416 1.37)	0.36	0.85
Close Relative as a Doctor					
No	70 (47.0)	79 (53.0)			
Yes	47 (43.93)	60 (56.1)	1.13 (0.69- 1.86)	0.63	0.23
Socioeconomic Status					
Low	30 (46.88)	34 (53.13)	1		
Medium	65 (48.87)	68 (51.13)	0.923 (0.51-1.68)	0.79	0.07
High	22 (37.29)	37 (62.71)	1.48 (0.72-3.05)	0.28	1.16
On Scholarship					
No	43 (41.35)	61 (58.65)			
Yes	74 (48.64)	78 (51.32)	0.74 (0.45- 1.23)	0.23	1.34
Personal Choice					
No	21 (55.26)	17 (44.74)			
Yes	96 (44.04)	122 (55.96)	1.57 (0.785- 3.14)	0.2	1.64

Table 4: Multivariate analysis to predict impostor scores.

Variable	Coefficient	Std Error	F-test	P-Value
Anxiety	0.174	0.068	6.4222	0.01188
Self-Esteem	-1.035	0.131	62.2068	0
Depression	0.318	0.138	5.2959	0.02219

Table 5: Chi square analysis between impostors and non-impostors.

Characteristic	Odds Ratio (95% CI)	p-value	X^2
Readiness to cope with challenges during internship years	5.16 (1.03-25.71)	0.04	4.84
Feeling of quitting the medical course	1.98 (1.32-2.98)	0.001	11.39
Confident to become a specialist in the future	1.76 (0.38-8.11)	0.46	0.54

The prevalence of impostorism from this study, which is 45.7%, is almost similar as the prevalence obtained in the study done in Ontario in the year 2008 involving internal medicine residents with prevalence of impostorism in 41% women and 24% men. Similar prevalence was also noted in two other studies involving health profession trainees.[3-4, 19] This shows that impostorism is extensively seen among those in the medical profession. When compared to impostorism among those from non-medical field, it is seen that the prevalence is much lower in those from non-medical field. A study involving college and research librarians found impostorism prevalence to be about 15% which is almost 3 times lower than prevalence in this study.[42] Another study involving engineering students found that the prevalence of impostorism to be at 35% which again is considerably lower than prevalence found in this study.[43] One of the reasons could be due to medical students being perceived as high achievers, hence putting a huge load of pressure and stress upon them.[32] Constant doubts about their capability and the fear of failing to live up to these expectations could also be the reasons behind this finding.[34] Medical students have many clinical rotations where they have to acquire medical knowledge and skills from each of the postings. Unfortunately, this often highlights the students' deficiencies more than their progress and competencies which further enhances their impostor feelings.[24] Having to cope with academic stress also contributes to their feelings of insecurity. [33]

The prevalence of IP in our study showed no gender difference, although IP was first thought to be exclusively seen in females.[1] Our result is consistent with other research findings, which disproves the exclusively female prevalence of IP.[8] Other psychological distresses like anxiety, depression and low self-esteem also showed no significant gender differences hence echoing other research findings.[25-26]

There are no significant differences in anxiety, depression and low self-esteem between males and females. This is in concordant with the findings made by Henning (1998) and Moffat.[19, 27] The lack of gender differences may be due to the recent changes in the environment of medical schools, with increasing female enrolment as is the case in majority of Asian medical schools.[19, 28]

Impostorism is also associated with anxiety and depression. However, since this is a cross sectional study, causality could not be determined. Based on this study, it is quite unclear as to how they are interrelated, whether the constant worry and self-doubt seen in impostors causes anxiety and depression, or rather that anxiety and depression causes a person to be more prone to have impostor feelings.[4] Thompson speculated that impostors' greater reporting of negative emotions as well as their tendency to attribute failure internally and overgeneralize a single failure may be a cause for the association with anxiety and depression.[29]

This study also found that impostors have lower confidence to face the challenges once they become House Officers in the near future. This might be due to the students' own exposure to the abuses faced by the House Officers from the Medical Officers as well as specialists in the hospitals. This causes the students to majorly doubt whether they can perform well as a House Officer in the future.[30] A study involving House Officers in one of the hospitals in the city of Ipoh, Malaysia, has ranked harassments by the Medical Officers as one of the main causes for stress in their work.[30] The increasing number of medicolegal cases involving House Officers also may be a cause for the self-doubt among medical students. Impostors were also found to have a higher tendency of wanting to quit the medical course. This may be due to the fact that impostors feel that they are not competent enough to cope with the expectations of the institution.[31]

Considering that the prevalence of IP among medical students is very high and that it is strongly correlated with other psychological distresses, it is crucial that medical schools and educators take note of this issue and take the necessary steps in dealing with medical students with high impostor traits. Literature regarding approaches taken to deal with impostorism in the medical school nor among healthcare workers is scarce, hence this is a potential future research area of importance. A few authors who had done similar research regarding impostorism among medical students and healthcare workers had recommended general approaches to deal with this issue. One of the authors suggested that impostorism can be prevented or remediated via the use of techniques such as mentoring, identification as well as promotion of self-concept.[40] Another author meanwhile suggested a shift away from the traditional "shame-based" learning to a more open and consistent educational dialogue.[35] In order to foster development of overall self-efficacy, professional development programs beginning early in medical training may confer some benefit.[41]

One of the limitations of the study is the way the Clance Impostor Phenomenon Scale are scaled, in which the questions are all scaled in the same direction where numeral five corresponds to high impostor phenomenon and numeral one is lack of it. Secondly, the sampling of this research, which is convenience sampling of all the fourth year medical students in MMMC, may not reflect the findings in other years of study or other medical schools in Malaysia. There is also a lack of normative data regarding Impostor Phenomenon among other fields of study, thus preventing comparison between medical students and students from other courses.

If this survey is representative of students from other medical schools as well, it does indicate that a huge amount of medical students in Malaysia are suffering from Impostor Phenomenon and may have psychological distress like anxiety, depression and low self-esteem. They will also have low confidence to face Housemanship period in the future. Medical schools, especially the educators and tutors should assist medical students to allow a smoother shift into the Housemanship period. Impostors who are identified could be provided with counselling and moral support which may help in reducing their level of depression and anxiety. More focus by the educators towards the impostors, especially in improving their knowledge and clinical skills, may help to ease the impostor feelings once they feel that they are competent and can be a safe doctor in the future.

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Case Report

Amoxicillin Morbilliform Drug Eruption in Pediatric Male with Poor Feeding Treated with Cyproheptadine: A Case Report

Daniel Nguyen,[1] Christina Vo.[2]

Abstract

Background: Cyproheptadine (CY) is an antihistaminic agent that is commonly used for symptom relief in skin conditions. The most common pattern of cutaneous drug eruption in children is the exanthematous type, with the penicillin family often cited. CY is also an antiserotoninergic agent with the side effect of appetite stimulation and has been used in children with poor feeding and poor weight gain. **The Case:** We report a case of a 31-month-old male patient seen in the outpatient setting with a diffuse morbilliform rash after use of amoxicillin for right otitis media. The patient was a post-operative congenital heart disease (CHD) patient, actively being treated with CY for feeding difficulties and low weight often seen in the CHD population. Amoxicillin was discontinued, while CY was continued. The patient did not encounter any pruritic symptoms during morbilliform rash, while weight gain of 3.1 kg occurred over a 9 months period, increasing patient from the 10th to 41st percentile. **Conclusion:** A review of studies on CY has shown antiallergic properties in histamine-mediated hypersensitivity reactions, most likely through H1 receptor antagonism. This mechanism may be used to address the pruritic symptoms during type IV T-cell mediated hypersensitivity cutaneous drug eruptions. CY also possesses 5-HT receptor antagonist properties with demonstrated ability to increase appetite in poor feeding pediatric patients. CY was successfully used for this purpose in our CHD patient.

Key Words: Amoxicillin; Exanthema; Cyproheptadine; Heart Defects, Congenital; Appetite (Source: MeSH-NLM).

Introduction

Pediatric drug-related cutaneous reaction patterns are numerous, but can generally be classified into five types: exanthemata, fixed drug eruptions, urticarial eruptions, serum sickness-like reactions, and photosensitive eruptions.[1] The most common pattern of cutaneous drug eruption in children is the exanthematous type.[1] The penicillin family is often implicated, with amoxicillin a frequent culprit.[1]

Drug reactions can occur in patients with co-morbidities, complicating the management. One potential comorbidity is failure to thrive, which may indicate the need for an appetite stimulant.[2] Cyproheptadine (CY) is an antihistaminic and antiserotoninergic agent that has United States Food & Drug Administration (FDA) approval for indications of allergic conditions while offering a beneficial side effect of appetite stimulation in various conditions.[3-4] These conditions include anorexia nervosa, cystic fibrosis, asthma, malignancies, stimulant-induced weight loss, malnourished, and short stature.[2,5] We present a patient being chronically treated with CY, who continued therapy to address a separate acute condition. The use of CY is reviewed for our patient's comorbidities, an amoxicillin adverse drug reaction and feeding difficulties in repaired congenital heart disease (CHD) patient.

Key Points:

- Cyproheptadine is an antihistaminic and antiserotoninergic agent that has US FDA approval for indications of allergic conditions, with beneficial side effects of appetite stimulation.
- Cyproheptadine is often used for symptomatic relief in pediatric patients for penicillin-induced exanthematous cutaneous drug eruption, a type IV T-cell mediated hypersensitivity. While using cyproheptadine, our patient did not have any pruritic symptoms during the morbilliform rash, from onset through resolution.
- Cyproheptadine has been used in feeding programs for children with feeding difficulties and poor growth. The post-operative congenital heart disease patient with a history of poor weight gain, increased in weight from 10.25 kg (10th percentile) to 13.35 kg (41th percentile) during cyproheptadine use.

The Case

We evaluated a 31-month-old Asian male in the clinic with a chief complaint of rash. The rash onset began a day before with no particular pattern (i.e., cephalocaudal), and described as non-pruritic, non-tender, worsening rash all over the body. Parents were unaware of any previous penicillin exposure while reporting up-to-date immunization status. Parents deny history of fevers, chills, cough, nausea, vomiting, diarrhea, allergies, or any other previous rash. Family history not significant for allergies or similar rashes. Recent upper respiratory infection of acute otitis media (AOM) was diagnosed in the patient eight days earlier, but no recent history of pharyngitis noted. Past medical and surgical history involved CHD diagnosed at 4 months of age, specifically atrioventricular canal defect, hypoplastic aortic arch, and patent ductus arteriosus. The patient was hospitalized at the time of discovery for medical management of heart failure, pulmonary overload, and failure to thrive (admission weight 5.3 kg [2.3 percentile, z-score = -2.0, CDC]) (***Figure 1***) with nutrition and diuresis optimized in anticipation of surgical repair. Complete repair performed at 6 months of age with no major issues in the operation room. Post-surgical complications developed for hypomobile left vocal cord, oral aversion, and poor weight gain.

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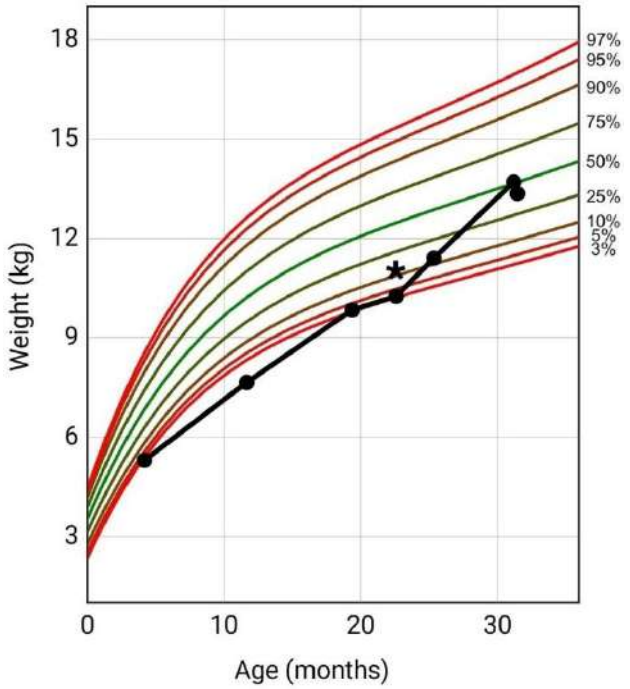
Medical interventions for low weight was initiated at 11 months of age (weight of 7.65 kg [0.4 percentile, z-score = -2.7, CDC]) with nutrition management, and consultations for dietician, gastroenterology, speech therapy, physical therapy, and occupational therapy. At 19 months of age, weight gain progressed to 9.84 kg (3.4 percentile, z-score = -1.8, CDC) but increases faded 3 months later (22-months of age) at a weight of 10.25 kg (3.2 percentile, z-score = -1.8, CDC). At this point, the decision was made to start oral cyproheptadine. Medications at time of current clinic visit included amoxicillin (7 ml of a 400mg/5ml suspension, twice a day) on day 9 of a 10-day course for recent AOM and CY (2.1 ml of a 2mg/5ml syrup, twice a day) for feeding difficulties. Besides current amoxicillin treatment regimen, no previous penicillin antibiotics noted in medical records. Vital signs at current visit showed temperature of 37.0 degrees Celsius, heart rate of 116 beats per minute, respiratory rate of 26 breaths per minute, and a recorded weight and height of 13.35 kg (41 percentile, z-score = -0.2, CDC), and 91.44 cm (44 percentile, z-score = -0.2, CDC), respectively, (***Figure 1*** and ***Figure 2***).

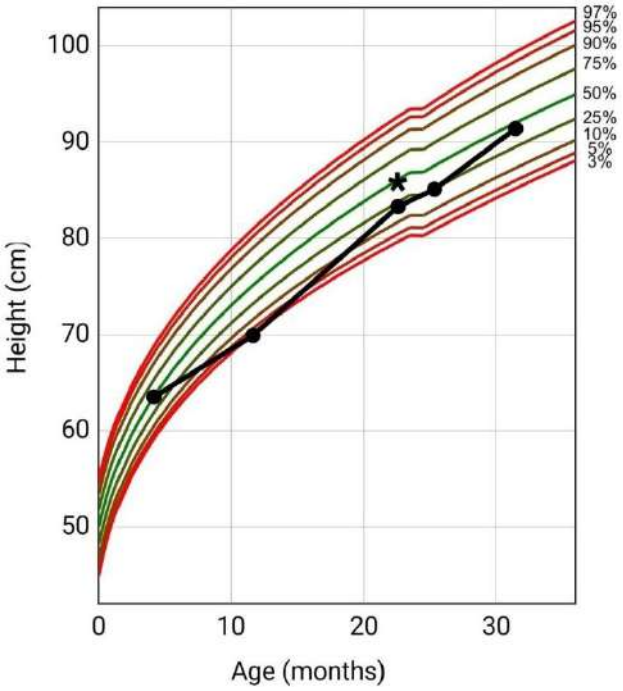
Figure 1. Patient Weight-For-Age Clinical Growth Chart (CDC) and Initiation of Cyproheptadine. *Initiation of Cyproheptadine at 22 Months of Age.



Physical exam showed a well-appearing child in no acute distress. Lungs were clear to auscultation. Heart was normal sinus rhythm with no murmurs identified. Oral exam showed moist mucous membranes with no mucocutaneous lesions or tonsillar exudates. Eyes were bilaterally negative for conjunctivitis. Nasal passages were patent, pink and moist. Ear inspection demonstrated pearly grey, mobile, non-bulging tympanic membranes bilaterally. Supple neck with no adenopathy appreciated. Abdomen exam observed no organomegaly. Skin findings revealed morbilliform rash consisting of round erythematous macule and papule lesions, ranging from 1 to 5 millimeters in diameter, distributed bilaterally on the head, trunk, and extremities, with several confluent patches (**Figure 3** and **Figure 4**).

No bullous lesions or desquamation was noted. Differential diagnosis included measles, rubella, scarlet fever, infectious mononucleosis associated amoxicillin rash, and unlikely, Kawasaki disease, anaphylaxis, and Stevens-Johnson syndrome - toxic epidermal necrolysis.

Figure 2. Patient Length-For-Age Clinical Growth Chart (CDC) and Initiation of Cyproheptadine. *Initiation of Cyproheptadine at 22 Months of Age.



History and physical exam, including timeline of amoxicillin administration, lead to a clinical diagnosis of adverse reaction to penicillin. Management involved consideration for discontinuation of medications. Amoxicillin was stopped due to high suspicion as the causative agent of the rash. Further antibiotic treatment deemed unnecessary as resolution of AOM was noted per physical exam. With a low index of suspicion for CY as the underlying etiology of the rash, the decision to continue CY was made. CY outpatient therapy was maintained for management of the dermatologic symptoms, including itch while sustaining enhanced appetite stimulation and weight gain effect. Patient's parents were in agreement to therapeutic plan as they reported good compliance with CY, positive response in terms of improved weight gain and absence of pruritic symptoms. Weight at current encounter was a 1.95 kg increase from the time of CY initiation. Per discussion with patients at a subsequent unrelated encounter, rash continued for 2-3 days after discontinuing amoxicillin and cleared approximately a week later.

Figure 3. Morbilliform Rash on Patient's Ventral Trunk.

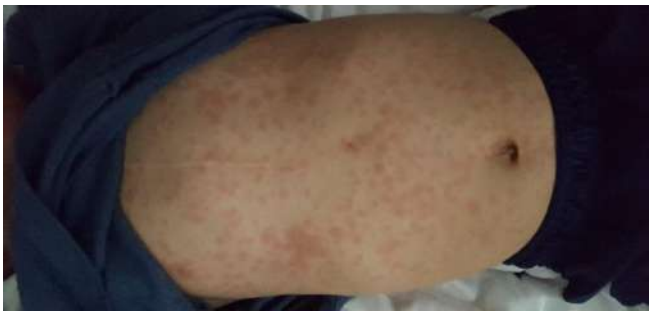
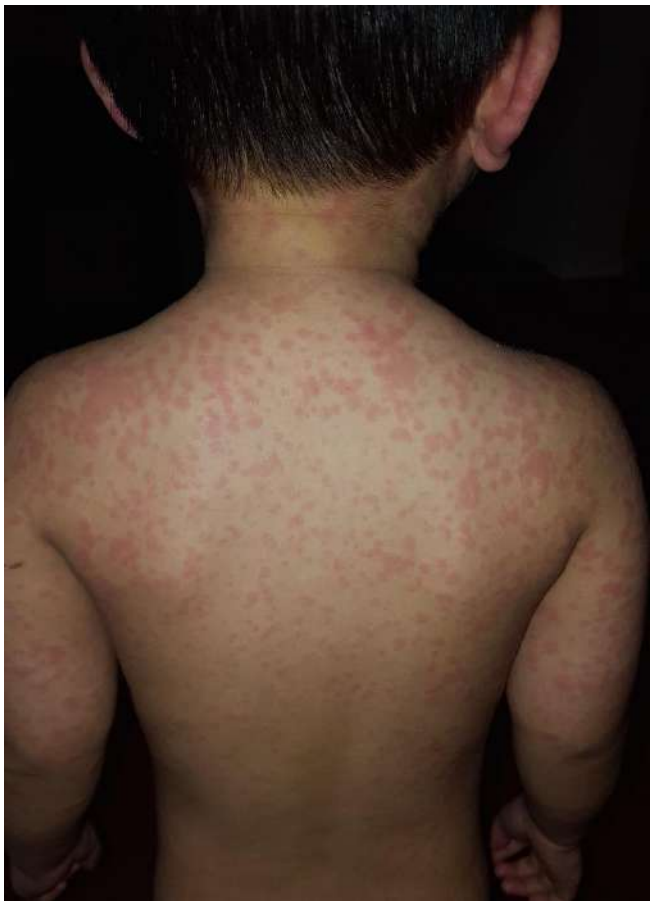


Figure 4. Morbilliform Rash on Patient's Dorsal Trunk.



Discussion

Cyproheptadine is a medication that has antiallergic and orexigenic properties and was utilized in this pediatric patient with an adverse reaction to amoxicillin and feeding difficulties subsequent to post-operative CHD repair.

A recent review of evidence for CY's antiallergenic effects in children by De Bruyne et al examined two small prospective comparative studies.[3] Six children in a double-blind, cross-over study showed CY to be similar in effectiveness to ketotifen for primary acquired cold urticarial clinical symptoms and ice cube test.[3] However, a randomized open-label study showed loratadine to be superior to CY in treating mite-induced allergic rhinitis.[3] Neither study had a placebo control group to compare with CY.[3] The studies above pertain to CY's antiallergenic effects in pediatric patients that are effective in disease states with pathophysiology involving mast cell degranulation leading to histamine release (i.e., type I IgE-mediated hypersensitivity reactions).[3] The suspected amoxicillin-induced morbilliform rash, with delayed onset and no associated antibody-mediated cytotoxic effects or immunocomplex mediated syndromes, was classified as a type IV delayed T-cell mediated hypersensitivity reaction.[6] Immunohistochemical studies of type IV reactions in the skin have found mononuclear cell infiltrates composed mainly of T cells, CD4 predominating over CD8, with additional neutrophils, eosinophils, macrophages, and keratinocytes involvement.[6] In particular, type IV maculopapular exanthema have shown an increase in eosinophils in the papillary dermis. [6] However, there is nothing in the literature that reports on CY's effectiveness in amoxicillin mediated type IV hypersensitivity reactions.[6] Cyproheptadine has well documented H1 antihistaminic properties, but no evidence exists for non-H1-mediated anti-inflammatory properties, which has been seen in other antihistamines agents.[7-8]

Still, antihistamines are commonly used in the management of type IV adverse drug reactions for dermatological symptoms.[9] A likely benefit is the antihistamines sedative effects leading to a reduction in itch, especially at night.[10-11] The natural course of an aminopenicillin rash is variable, with resolution of rash reported 7-15 days after therapy cessation.[12] Our patient's rash continued for approximately 10 days after amoxicillin withdrawal, consistent with normal rash resolution. Additional consideration for an unclear diagnosis of a rash that may be a type I IgE-mediated hypersensitivity, could benefit from CY and it's FDA indication as adjunctive therapy, in addition to standard measures.[4]

In regard to off-label appetite stimulant evidence found by De Bruyne et al for CY in pediatric patients, there were two retrospective studies.[3] A retrospective chart review found 82 children with low appetite and poor growth who took CY regularly, where 96% of parents reported a positive change in mealtime and feeding behaviors.[2-3] Additionally, significant improvement in mean weight-to-age Z scores was observed after starting CY.[2-3] A retrospective open-label study for the efficacy of CY in dyspeptic children showed positive overall response in 55% of patients.[3] A search of the medical literature did not reveal any reported cases of CY use in a post-operative CHD patient. CHD patients can have increased energy and nutrient needs, complicated by feeding difficulties.[13] As our patient had a multi-disciplinary team addressing nutrition, development/behavioral, psychosocial issues over a course of a year with failure to reach catch-up growth, adjunctive therapy in the form of CY was initiated before considering escalating management to a pediatric feeding program.[2] Cyproheptadine's antiserotoninergic properties is thought to play a major role in appetite stimulation, though the mechanism is not well understood. A hypothesis for the mechanism of action include antihistaminic and antiserotogenic receptors at the ventromedial hypothalamus and CY influence on growth hormone and insulin-like growth factor axis.[2] Either or both of these mechanisms could play a role in increasing appetite and causing weight gain in post-operative CHD patients.

Cyproheptadine has been reported as a safe medication in the pediatric population.[2,5] Aside from expected increased appetite, reported adverse effects included self-limited somnolence, irritability, and abdominal pain that often resolves after the first few days of therapy.[2-3,5] One case report of CY toxicity in a 5-year-old female described signs and symptoms consistent with anticholinergic toxicity, urinary incontinence, and tachycardia.[14] Our patient had no reported adverse effects from the medication.

Limitations for use of CY in cutaneous drug reactions include patient presenting for a rash that is asymptomatic, exposing the patient to unnecessary drug risks. Limitations of weight gain in post-operative repaired CHD revolves around the difficulty in attributing weight gain to medication opposed to the natural course of improvement after correction of the defect. As CY has been well-tolerated in studies with rare adverse events, the clinician should carefully consider the risk versus the benefits of the medication.[2-3,5]

In conclusion, this case report reviews studies of CY as an antiallergic and orexigenic agent and CY's application to a post-operative CHD patient with new-onset amoxicillin morbilliform drug eruption in the background of poor weight gain. Cyproheptadine's H1 and 5-HT receptor antagonist properties are the mechanism's most strongly supporting CY's use in histamine mediated hypersensitivity reactions and appetite stimulation. We suspect CY may provide some benefit specifically for delayed type IV T-cell mediated hypersensitivity drug reactions and increased feeding in CHD patients. Clinicians can utilize the dual mechanisms of action in their pediatric patients for various allergic indications and/or difficulty feeding and poor weight gain.

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IJMS INTERNATIONAL JOURNAL of MEDICAL STUDENTS

Experience

The Experience of Transitioning from Being a New York City Paramedic to Medical Intern in the Dominican Republic

Reynolds A. Kairus.[1]

The Experience

When breaking down the word paramedic – para is a prefix for beside and medic stands for a doctor or medical practitioner (Available from: http://www.wordcentral.com/cgi-bin/student?paramedic, updated 2007; cited 2018 Feb 13.). We are an extension of the doctor in people's homes and in the prehospital setting. Working as an emergency medical service (EMS) provider in New York City (NYC) before medical school as well as during medical school in Dominican Republic (DR) gave me great insight on medical practice.

In NYC the emergency rooms (ERs) filled over capacity go into diversion, while in DR ERs this is not an option (***Figure 1***). In the DR, medical students, residents, and sometimes even patient's relatives serve the role as respiratory therapist, squeezing the oxygen bag for an intubated patient for days on end due to the constant shortage of ventilators.

Being an experienced paramedic allowed me to make invaluable correlation from patients seen in the pre-hospital setting with lectures and clinical exposures during medical school. I have seen the manner in which the evolution of medical mnemonics like ABC (**A**irway, **B**reathing, **C**irculation), later replaced with CAB (**C**ompressions, **A**irway, **B**reathing), likewise MONA (**M**orphine, **O**xygen, **N**itroglycerin, **A**spirin) and LMNOP (**L**asix/**L**oop diuretic, **M**orphine, **N**itroglycerin, **O**xygen, **P**osition: **P**rop up the patient) save the lives of many. Other invaluable lessons were learning how to cope with stress, recognize life threating conditions and use the skills learned to act accordingly.[1]

I became an emergency medical technician in 2003 and then a paramedic in 2007 and my scope of practice went from basic life support to advanced life support, respectively.[2] I started pre-med in 2010 and medical school in 2013 in the DR. I completed my training (internship) in the DR public health system (PHS). The internship was pretty eventful, to say the least. We had remodeling, Pseudomonas contamination of the water supply, hospital staff being robbed and/or kidnapped near hospital grounds and a multi-drug resistant Tuberculosis scare.

Despite these calamitous circumstances the medical training in the DR has been extremely beneficial. Interns in this PHS who show interest, are team players and are willing to ask for an opportunity can obtain hands on experience which other medical students in more developed countries can only dream of. For example, I've been able to scrub into and assist in a variety of surgeries, I've intubated pediatric and adult patients and been able to teach CPR and First Aid to lay rescuers and health care providers, just to name a few.

As a paramedic, I immediately noticed improvements that can be made on the ambulances. Usually the ambulances are under-equipped and staffed with people who did not receive formal basic life support (BLS)

or advanced cardiac life support (ACLS) training. In the vast majority of cases the patients are transported by their families, which more often is the quicker option.

Figure 1. Lower Extremity Fraction.

Legend: This is a patient with a lower extremity fraction [December 2017]. Note the cardboard box that was used as a splint. Also, note that the stretcher has no sheet and that the traction is being applied by two gallons of water tied to metal rods.

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Community hospitals are mainly used for ambulatory care and provide initial treatment for patients who require further care at the regional referral center. In most cases the emergency rooms are staffed by general practitioners due to the fact that Emergency Medicine is still a relatively young field in DR. The lack of general medical supplies makes accommodations like sterile dressing, bed sheets and pillows hard to come by.[3] The patient's relatives are usually in charge of providing both necessary medical supplies and patient comforts.

The PHS shortage of supplies has affected every medical role.[4] Attendings, residents, interns, medical students, nursing staff, patients and their relatives on a daily basis create innovative solutions (***Figure 2***). In the DR PHS, medical tape is used as electrical tape, empty plastic gallon containers are used as sharp bins. If post neurosurgery patients requiring drainage, a collapsed saline bottle is used as an active suction device. As a replacement for orthopedic traction splints, gallons of water tied to the metal rods are used to stabilize long bone fractures. Physicians regularly intubate patients without a stylet – now that's impressive!

In the prehospital setting we also learn how to work under very uncomfortable circumstances. If the patient is at home, unconscious and stuck behind some furniture then we move the furniture. If intubation is indicated and the patient is lying supine on the floor then we lie prone on the floor to get a better visualization of the vocal cords, and so on. The DR PHS is very similar in that sense. If the patient is poor and cannot pay for their lab tests then we try to help or cover the bill. If there is the possibility of Pseudomonas in the water supply, patients and staff bring their own bottled water. If there is no suture kit and the bleeding control must be accomplished, then they use their gloved hands with extreme caution, and so on.

I highly recommend that students have some kind of health care provider experience prior to or during medical school. Whether that experience comes from a paid job or volunteering. It provides great familiarity, practicality, and confidence. If asked to say what three words come to mind when asked about the NYC EMS system and the PHS in DR, I would say: resourceful, efficient and resilient.

Figure 2. Sterile Field.

Legend: This is a picture of a sterile field used during invasive procedures [December 2017]. The inside part of a sterile glove is used as a container of Povidone-iodine and Chlorhexidine mixture. The sterile mixture is sitting on top the of 7.5 sterile glove wrapping papers that are used as a sterile barrier to place surgical equipment on.

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IJMS INTERNATIONAL JOURNAL of MEDICAL STUDENTS

Experience

How Medical Students Edited an OSCE Study Guide and Why Should You?

Mathieu Allard,[1] Alexandre Lafleur,[2] Elizabeth Richard,[1] Annick Lebouthillier,[1] Cédric Vailles.[1]

The Experience

Since 2010, our group of medical students has been involved, as part of our extra-curricular activities, in designing and sharing resources to learn clinical skills in preparation for objective structured clinical examinations (OSCEs) and clinical rotations.[1] In order to address the challenge that OSCEs represent early in our medical training, we publish this year the second edition of a 450-pages OSCE study guide to help medical students learn hypothesis-driven clinical examination (***Figure 1***).[2] With quality books on OSCEs already published, you might wonder why medical students should invest their time and energy in this colossal project, and how to do so?

Meaningful projects create united communities

Creating a synthesis is more useful if you share it with friends. Imagine if one out of four students in your school was involved in the same project. Over the years, more than 500 students of our school contributed to this work through many subcommittees (***Figure 2***). One led to discussion groups on clinical topics; another created an online application. Positive leadership united the students under a scholarly project that they were proud of. Here are pieces of advice taken from our experience.

Figure 1. Cover Page of the Petit Guide des Habiletés Cliniques 2nd Edition (in French), an OSCE Study Guide Entirely Written and Edited by Medical Students of Laval University.

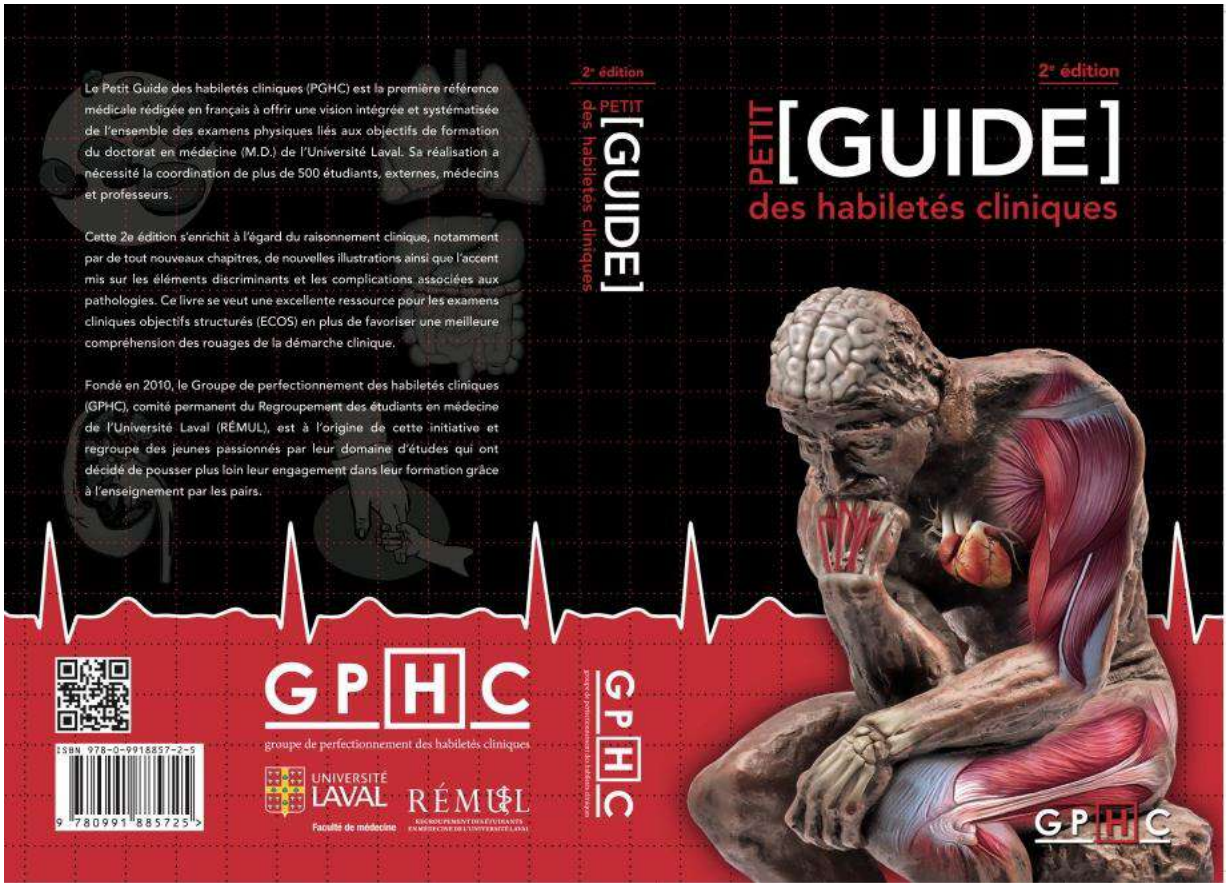

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Figure 2. Over the Years, more than 500 Students of Laval University School of Medicine Contributed to this Work through many Subcommittees.

Don't reinvent the wheel

Whereas most book on OSCEs present general notions, our book emphases on pathologies affecting our population (e.g. tuberculosis in Inuit communities). It takes into account the evolution in local technologies (e.g. implementation in future editions of point-of-care ultrasound findings) and uses frameworks already presented in previous courses, hence familiar to students. Evolving to answer students' needs, we added a section on hypothesis-driven clinical examination focusing on discriminative findings, short clinical scripts and pitfalls.[3-5]

The added value of involving senior students and faculty

More than 40 faculty members and clinicians helped review the chapters, giving us a unique opportunity to learn from them outside class. It is essential that the content be reviewed with content experts but also with the mentorship of clinicians who guided us in what is common, uncommon, or a 'do-not-miss'.[6] Senior students and residents provided insightful comments regarding which format and content would be useful on the ward (***Figure 3***).

You don't need to be a professional editor to publish a book

You might think that editing a book or an application is out of reach for medical students. On the contrary, software for editing is getting simpler and high-quality printing is affordable. We did not involve professional editors and distributed our books in collaboration with medical faculty bookstores. As a non-profit organization, we were able to finance new projects. All students and faculty worked as volunteers.

Have a strong leadership but don't play solo

Based on our experience, we suggest a group of less than four editors-in-chief, in order to have a clear perspective of the project's purpose and to ensure the standardization of all chapters. The editors-in-chief divided the work among chapters' authors. Chapters' authors created groups of students with an interest in the discipline. Students saw the advantage of getting to know the clinicians of this discipline and learn from their clinical experience. Involving lecturers was worthwhile to create links with the content and format of the courses. Throughout the final steps of the editing, we hired a company for the linguistic review and ultimately, before printing and publishing, professional graphists helped us by working on the cover and interior design in creating a good-looking and easy-to-use book.

To teach is to learn

Many hours were invested in discussing, synthetizing and reviewing relevant medical content. Those who learned the most were obviously the medical students who created the books. We believe it had an educational impact that would have been harder to achieve if the Faculty would have imposed this project. Medical students already spend hours making synthesis and studying.[7] Why don't you turn this into a collective educational innovation in your school too?

Figure 3. In this Example of the Hypothesis-Driven Clinical Examination Section, Vertigo is Categorized in Three Tables Displaying the Discriminating Findings of the History and Physical Examination.

VERTIGE

		HISTOIRE	EXAMEN PHYSIQUE
VERTIGE CENTRAL	**AVC** (tronc cérébral, cervelet)	• Sx neurologiques focaux • Vertige constant d'apparition subite	• Nystagmus vertical ou non-épuisable • Anomalies des NC ou des épreuves cérébelleuses
	SEP	• Épisodes non-expliquées de Sx neuro récurrents, réversibles, disséminées dans le temps et l'espace • Intolérance à la chaleur / Uhthoff	• Signe de l'Hermitte • Signes de MNS (faiblesse, spasticité, hyperréflexie, babinski+) • Signes neurologiques focaux, variable
VERTIGE PÉRIPHÉRIQUE	**VPPB**	• Début soudain provoqué par mouvements brusques de la tête (svt dans le lit au réveil) • Durée de quelques secondes	• Dix-Hallpike positif (nystagmus horizonto-rotatoire vers l'oreille aN) • E/P neuro normal (sauf romberg)
	Maladie de ménière	• Épisodes de vertige récurrents de durée de plusieurs minutes à heures • Baisse d'audition, sensation d'oreille pleine ou acouphène persistant entre les épisodes de vertige	• Baisse d'audition neurosensorielle uni ou bilatérale
	Neuronite vestibulaire/ Labyrinthite	• Vertige très sévère de durée de quelques heures à journées avec No/Vo • Associé à une IVRS ou une OMA (labyrinthite)	• Head thrust aN • Baisse d'audition neurosensorielle unilatérale (labyrinthite) • Vésicules CAE si Ramsay Hunt
	Rx ototoxiques (ex : aminoglycoside)	• Lien chronologique entre la prise de médicament et le vertige • Possible perte d'audition bilatérale	• Possible perte d'audition bilatérale
	Neurinome acoustique	• Atteinte de l'audition/acouphène dominante (peu ou pas de vertige) • Apparition progressive sur plusieurs semaines/mois (chronique)	• Baisse d'audition neurosensorielle unilatérale • Paralysie NC V et VII
NON VESTIBULAIRE	**Lipothymie** (choc vagal, arythmie, etc.)	• Patient âgée, connu cardiaque • Sx d'HTO • DRS, Palpitation	• Bradycardie • Rythme cardiaque irrégulier et HTO • TA couchée / debout
	Perte d'équilibre à la marche (polyneuropathie diabétique, etc.)	• Connu diabète de longue date • Démarche instable, chutes	• Atteinte sensitive en gant et en chaussette • Romberg +
	Étourdissement non spécifique (multiple cause, svt associé aux troubles anxieux et dépressifs)	• 4S : Sx nombreux (>6), Stress, Sévérité des symptômes, poor *Self-rated healt* (santé rapportée médiocre)	• E/P normal

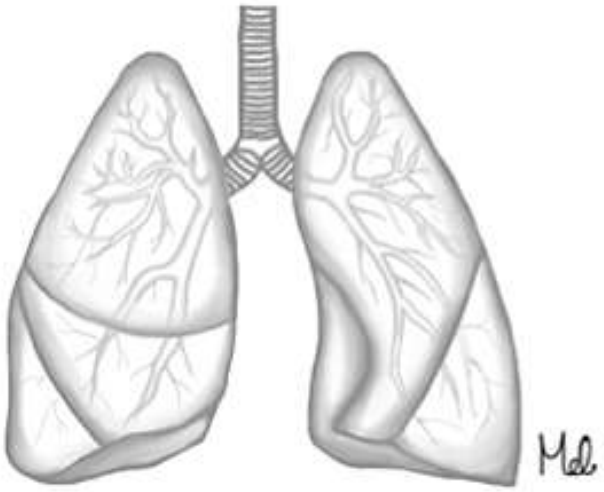
Remarques :
Lors de l'entrevue, il est important de catégoriser l'étourdissement en évitant les questions suggestives. Optez pour une question telle que : « Décrivez-moi la sensation que vous expérimentez sans utiliser le mot étourdie »

- *Vertige : sensation de mouvement rotatoire dans l'espace*
- *Lipothymie : sensation d'évanouissement imminent*
- *Perte d'équilibre à la marche : sentiment de déséquilibre ou d'instabilité qui se produit principalement à la marche*
- *Étourdissement non spécifique : Sensation non spécifique, d'être «juste étourdie» ou de «tête légère»*

Figure 4. More than 40 Faculty Members and Clinicians Helped Review Chapters like this One on Respiratory Medicine.

PNEUMOLOGIE

Florence Tremblay, rédactrice en chef
Audrey Desjardins, Emma Roy, Valérie Roy et **Catherine Sweeney**, rédactrices
Dr Michel Cauchon, Dre Andréanne Côté, Dre Émilie Millaire et **Dr Mathieu Simon**, réviseurs



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IJMS INTERNATIONAL JOURNAL of MEDICAL STUDENTS

Experience

Participation of IJMS in the EIRCECS in Paraguay: Growing through the Ambassadors

Arturo Silvero-Isidre,[1] Sebastián Ocampo.[1,2]

The Experience

The International Meeting of Student Scientific Journals of Health Sciences (EIRCECS, from the Spanish Encuentro Internacional de Revistas Científicas de Estudiantes de las Ciencias de la Salud) is an event held annually at the International Scientific Congress (CCI from the Spanish Congreso Científico Internacional) of the Latin American Federation of Scientific Societies of Medical Students (FELSOCEM from the Spanish Federación Latinoamericana de Sociedades Científicas de Estudiantes de Medicina) since 1998.[1] The last meeting was held at the XXII CCI - Asunción, Paraguay 2017, and the organization of the meeting was in charge of the journal Discover Medicine, a Paraguayan student scientific journal. Due to geographic proximity, usually only Latin American journals participated in most of the meetings. Therefore, the participation of the International Journal of Medical Students (IJMS) in this meeting was a novelty.

Student Journals

Eight student journals participated in the event, with some of them having more than 30 years of experience and others only months of circulation (***Table 1***). It is interesting that the IJMS has its origins in the XXIV CCI of the FELSOCEM in 2009 and the primary goal is to be an international divulgation tool for medical students using the highest standards of scientific publication. Compared with other journals, all the content is in English, which allows a wider audience, as well as articles from all around the world.[2]

Development of the Event

Several lectures focused on expediting the editorial process, improving the quality of publications, increasing the submission of manuscripts, and steps to start a journal. Workshops were also developed to describe the most frequent difficulties and offer strategies to solve them. During the meeting, the work of student journals was highlighted, which all seek to meet international requirements. Although most of them present indexations in databases, none has managed to enter the most important databases such as SCOPUS and ISI – Web of Science, which encourages us to continue improving.[3] Student journals have proven to be an important means of dissemination in Latin America, where students and young researchers can become familiar with the scientific publication and also participate in editorial processes.[3] However, difficulties are frequent, such as: lack of support from university authorities, limited financial resources, deficient scientific training, and lack of time. Therefore, the discontinuity of student journals is a frequent risk.[4]

Ambassador Program

Since the beginning of my medical career, I have been interested in scientific development and dissemination, considering that writing skills lack in many medical programs and are fundamental for the advances of research. Consequently, I have been Ambassador of IJMS for Paraguay since 2016, and I represented the journal in this event through this position. I had the opportunity to give a talk about IJMS, its organization, especially the roles of Ambassadors and Partners that are very innovative strategies to increase the impact, and the achievements, such as the broad indexation in databases. At that time, excluding IJMS, 5 of the 7 student journals were indexed in databases, with an average of 5 indexations each one. Instead, IJMS reached 31 indexations.

Importance

The opportunity to share among student journals is very useful (***Figure 1***). Medical students are not unaware of the growing trend of science and its importance for development. Therefore, they search places where they can develop their scientific skills. Considering that clinical researchers are scarce, the opportunity to become familiar with scientific processes in the undergraduate level makes student scientific journals an ideal place to promote future physicians committed with research and scientific dissemination.[5-6] In Latin America, scientific production is low compared to other regions, but the attitude of medical students who decide to be promoters of scientific growth and an example of self-improvement is remarkable.

Table 1. Journals that Attended EIRCECS 2017.

Journal	Country	First Edition
Revista Médico Científica	Panama	1980
CIMEL	Peru	1995
Revista Científica Ciencia Médica	Bolivia	1996
Revista Científica	Bolivia	2004
IJMS	United States of America	2013
FONENDO	Bolivia	2017
Colombian Journal of Medical Students	Colombia	2017
Discover Medicine	Paraguay	2017

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Conclusion

When considering this experience, it is notorious that IJMS has an immense potential due to the great influence, because of its several Partners, more than 11.000 followers on social networks and more than 120 Ambassadors distributed in 50 countries, which could lead initiatives to develop the skills related to scientific publication throughout the world. It is an optimal time to develop the potential of the Ambassadors of IJMS that could develop from scientific writing courses in different languages to multi-centric projects to continue increasing the prestige and influence of our journal.

Figure 1. The International Meeting of Student Scientific Journals of Health Sciences (EIRCECS in Spanish). Asunción, Paraguay. Year 2017.

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