Rev. Fac. Med. Hum. 2019;19(2):16-26. (April 2019)
DOI 10.25176/RFMH.v19.n2.2069
ARTÍCULO ORIGINAL

ISSN Version Online: 2308-0531
Facultad de Medicina Humana URP

CHILDHOOD OVERWEIGHT AND OBESITY IN THE REGIONAL HOSPITAL OF MOQUEGUA

SOBREPESO Y OBESIDAD INFANTIL EN EL HOSPITAL REGIONAL MOQUEGUA

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ABSTRACT

Objective: To establish the prevalence, epidemiology, clinical, biochemical characteristics and images of overweight and obesity in children from 5 to 10 years of age treated in outpatient pediatrics of the Moquegua Regional Hospital between August to December 2017. **Methods:** A descriptive, observational, cross-sectional study was carried out; a database was created in the SPSS version 23 program, descriptive statistics were used to determine if there were significant differences between the variables Chi-square. **Results:** Of a total of 170 children from 5 to 10 years of age attended in the outpatient clinic of pediatrics of the Moquegua Regional Hospital, 88 children (51.8%) were found with overweight and obesity according to the WHO 2007 Diagnostic criteria; 36 children (21.2%) with overweight and 52 children (30.6%) with obesity. **Conclusion:** The present study shows an increase in the prevalence of overweight and obesity in children from 5 to 10 years old, with epidemiological, clinical, biochemical, ultrasound and radiographic images very important to develop non communicable diseases such as diabetes, hypertension, dyslipidemias, cancer, metabolic syndrome, among others, causing an inadequate quality of life. As a result, a public health problem is created and therefore an increase in morbidity and mortality in our Moquegua Region.

Key words: Body mass index; Overweight; Obesity. (source: MeSH NLM)

RESUMEN

Objetivo: Establecer la prevalencia, características epidemiológicas, clínicas, bioquímicas y de imágenes del sobrepeso y la obesidad en niños de 5 a 10 años de edad atendidos en consulta externa de pediatría del Hospital Regional Moquegua entre los meses de agosto a diciembre del 2017. **Métodos:** Estudio descriptivo, observacional, trasversal; se creó una base de datos en el programa SPSS versión 23, se empleó estadística descriptiva, para determinar si existían diferencias significativas entre las variables, se utilizó Chi cuadrado. **Resultados:** De un total de 170 niños de 5 a 10 años atendidos en consultorio externo de pediatría del Hospital Regional Moquegua se encontró 88 niños (51.8%) con sobrepeso y obesidad según criterios de diagnóstico OMS 2007; 36 niños (21.2%) con sobrepeso y 52 niños (30.6.%) con obesidad. **Conclusión:** El presente estudio nos muestra un incremento en la prevalencia sobrepeso y obesidad en los niños y niñas de 5 a 10 años, con características epidemiológicas, clínicas, bioquímicas y de imágenes muy importantes para desarrollar enfermedades no trasmisibles como diabetes, hipertensión arterial, dislipidemias, cáncer, síndrome metabólico, entre otras, ocasionando una calidad de vida no adecuada, resultando un problema de salud pública y por ende un aumento de la morbimortalidad en nuestra Región Moquegua.

Palabras clave: Índice de masa corporal; Sobrepeso; Obesidad. (fuente: DeCS BIREME)

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Quote as: José L. Medina-Valdivia. Childhood overweight and obesity in the regional hospital of Moquegua [Original Article].2019;19(2):16-26. (April 2019). DOI 10.25176/RFMH.v19.n2.2069

Journal home page: http://revistas.urp.edu.pe/index.php/RFMH

INTRODUCTION

Obesity is a public health problem and has been called the "21st Century Epidemic" because of its impact on morbidity and mortality, quality of life, and health expenditure. It is presented globally in developed countries and the process of development, and it has also increased the contribution of known risk factors that cause it[1].

Overweight and obesity cause the death of around 2.8 million people in the world indirectly or indirectly, associated with diseases-communicable chronic diseases (CNCD) such as diabetes mellitus, coronary ischemic disease and some types of cancer[2,3].

In Peru, one in four children between 5 and 9 years old has overweight or obesity[4,5]. In the Moquegua Region in the age group of 5 to 9 years, the nutritional problem focuses on the magnitude of overweight and obesity; where 4 out of 10 children are overweight. It should be noted that this proportion is even higher than the national average and four greater in children under 5 years old. In the age group from 10 to 19 years old, there are fewer cases of subjects with overweight and obesity, than the previous age group. Also, 2 out of 10 subjects are overweight, but both surpass the national prevalence[4].

INDICATOR	5-9 YEARS		INDICATOR	10 -19 YEARS	
	PERU	MOQUEGUA		PERU	MOQUEGUA
Severe thinness	0.5	0.0	Severe thinness	0.2	0.0
Thinness	0.6	0.0	Thinness	0.9	0.0
Normal	74.5	58.4	Normal	84.8	78.0
Overweight	15.5	24.1	Overweight	11	14.4
Obesity	8.9	17.5	Obesity	3.3	7.7

Source. National Household Survey (ENAHO-CENAN). 2009 - 2010

Peru has not been oblivious to the problem of overweight and obesity and in mid-May of 2013 enacted Law No. 30021 "Law on the promotion of healthy eating for children and adolescents." The primary purpose is to promote healthy eating aimed at students of the fundamental level and help with their physical activity. Help with the implementation of kiosks and healthy diet in educational institutions regularly. Also with the implementation of the Observatory of Nutrition of Overweight and Obesity and advertising information and other practices aimed at children and adolescents to reduce and eliminate diseases linked to overweight, obesity and chronic diseases6. This law has had mixed opinions, but it is undeniable that it contributes to decreasing the high prevalence of overweight, obesity and consequently chronic diseases not transmissible in the Peruvian population.

In recent decades, the general population has adopted unhealthy lifestyles such as the consumption of fast food with high caloric content, and at the same time, physical activity has decreased. A reason that obesity has increased in the country could be because of the stability of the economy in Peru, which is reflected in the greater acquisitive capacity in households. Socio-economic changes have also been noticed in the population, especially in urban areas like transportation ways that the community uses to move for short stretches, the use of elevators, the use of technology for entertainment which contributes to the increase of sedentary lifestyle, mainly in adults and children[7,8].

The World Health Organization (WHO) defines childhood obesity when the body mass index (BMI) exceeds the 97% percentile for determined age and sex, of overweight in those children who have a BMI between the 85% and 97%[9].

The Task Force report mentions that they have not yet been found the right strategies to stop this problem, which is why it is necessary to increase the interest of health institutions[10], implying changes in the micro and macro environment that increase prevention, detection,

and treatment[11]. To know the prevalence, epidemiological characteristics, clinical, biochemical and imaging of overweight and obesity in girls and boys from 5 to 10 years treated in an outpatient pediatric office of the Moquegua Regional Hospital; the present study was made.

METHODS

A descriptive, observational and transversal. The objective was to establish the prevalence, characteristic clinical epidemiology, biochemistry and imaging of overweight and obesity in children from 5 to 10 years of age, treated in outpatient pediatrics of the regional Hospital Moquegua between August to December of the year 2017.

The sample consisted of all boys and girls from 5 to 10 years old who were treated in the pediatric office of the Regional HospitalMoquegua during the study period. The present investigation was authorized by their parents and/or attorneys, through informed consent.

The nutritional evaluation (normal weight, overweight, obesity) was established according to body mass index (BMI): weight/size², creating the percentiles of BMI according to the WHO 2007.

WHO defines childhood obesity when the index of body mass (BMI) exceeds the percentile values of 97% according to age, and sex. Overweight are those boys and girls who have a BMI between the 85th percentile and 97%[9]. The abdominal perimeter (PA) was obtained with a tape measure taking into account the location of the midpoint between the last rib and the iliac crest. For the abdominal perimeter, tables were established from the 10th percentile to the 90th percentile in both males as women according to age[12]. Both anthropometric measures were performed according to methodology recommended by the National Center for Food and Nutrition of the National Institute of Health Peru (CENAN). Systolic and diastolic blood pressure was obtained by to the use of bracelets according to age, considering percentiles from 5% to 95% percentile according to size and age of the patient[13]. For the evolution of the biochemical characteristic (total cholesterol, triglycerides, LDL cholesterol, and HDL) percentile tables were established from the 50th to 95th percentile according to age and sex of the patient[14]. All the auxiliary biochemical analysis (lipid profile and glucose) were taken on an empty stomach. Supplemental imaging examination (ultrasound) hepatic) was performed to determine hepatic steatosis, which was conducted by the radiology specialist of the Moquegua Regional Hospital.

All the data were extracted from the clinical history, also provided by parents or companions of the patients in the outpatient clinic of pediatrics. The information obtained was recorded on a sheet of data collection developed for this study, subsequently moved to a worksheet in Excel to then create the database and process them in the SPSS program Version 23.

Ethical aspects

The study did not involve any health risk and integrity of the participants. The parents or guardians of the boys and participating girls were previously informed on the objectives and purposes of the study.

Statistical analysis

A database was created in the SPSS Version program 23, descriptive statistics were used to determine if there were significant differences between the variables, Chi-square was used.

RESULTS

Out of a total of 170 girls and boys aged 5 to 10 attending the Hospital's outpatient clinic Regional Moquegua, 88 children (51.8%) with overweight and obesity, according to diagnostic criteria WHO 2007, 36 girls and boys (21.2%) with overweight and 52 girls and boys (30.6.%) with obesity were found (table 1).

Table 1. The general prevalence of overweight and obesity.

NUTRITIONAL ASSESSMENT	FREQUENCY (N°)	PERCENTAGE (%)
Normal weight (IMC <85p*)	82	48.2
Overweight (IMC ≥ 85p*)	36	21.2 **
Obesity (IMC ≥95p*)	52	30.6 **
Total	170	100

Source: Clinical history. / * IMC -OMS / ** p <0.05

Table 2. Prevalence of obesity and overweight according to age and sex.

AGE GROUP	NORMAL WEIGHT		OVERWEIGHT		OBESITY		TOTAL
	MALE	FEMALE	MALE	FEMALE	MALE	FEMALE	
5 years	14	16	4	3	8	2	47
6 years	5	6	8	9	6	1	35
7 years	5	8	3	1	4	1	22
8 years	11	2	3	1	9	4	30
9 years	2	5	0	1	6	2	16
10 years	6	2	2	1	7	2	20
	43	39	20	16	40*	12	170

Source: History clinic. ***p<0.05**

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In Table 2, it is observed that the age groups that present more cases are the 6 and 8 years old with the diagnoses of overweight and obesity, respectively. The male sex predominated in overweight and obese patients. It was found a significant statistical relationship between males and obesity (p <0.05).

Table 3. Prevalence of obesity and overweight according to age and sex.

PLACE OF ORIGIN	NORMAL WEIGHT		OVERWEIGHT		OBESITY		TOTAL	
	(N)	(%)	(N)	(%)	(N)	(%)	(N)	(%)
• C.P.M. SAN ANTONIO	26	15.3	10	5.9	22	12.9	58	34.1
• CERCADO DE MOQUEGUA	19	11.2	9	5.3	12	7.1	40	23.5
• DISTRICT OF SAMEGUA	17	10.0	6	3.5	4	2.3	27	15.9
• C.P.M.SAN FRASCISCO	15	8.8	9	5.3	10	5.9	34	20.0
• ZONA ALTO ANDINA	4	2.3	2	1.2	3	1.8	9	5.3
• OTHER CPM AND/OR DISTRICTS	1	0.6	0	0.0	1	0.6	2	1.2
	82	48.2 %	36	21.2 %	52	30.6%	170	100%
			p<0.05		p<0.05			
IE OF ORIGIN	**NORMAL WEIGHT**		**OVERWEIGHT**		**OBESITY**		**TOTAL**	
	(N)	(%)	(N)	(%)	(N)	(%)	(N)	(%)
• Particular	7	4.1	11	6.5	27	15.9	45	26.5
• State	75	44.1	25	14.7	25	14.7	125	73.5
	82	48.2%	36	21.2%	52	30.6%	170	100 %
					p<0.05			

BIRTH WEIGHT	NORMAL WEIGHT (N)	(%)	OVERWEIGHT (N)	(%)	OBESITY (N)	(%)	TOTAL (N)	(%)
• Less 2,500g	4	2.3	3	1.8	10	5.9	17	10.0
• De 2,500-3,999g	78	45.9	28	16.5	31	18.2	137	80.6
• More of 4,000g	0	0.0	5	2.9	11	6.5	16	9.4
	82	48.2%	36	21.2%	52	30.6%	170	100 %
				p<0.05				
REASON OF VISIT	**NORMAL WEIGHT (N)**	**(%)**	**OVERWEIGHT (N)**	**(%)**	**OBESITY (N)**	**(%)**	**TOTAL (N)**	**(%)**
• I.R.A.S	60	35.2	19	11.1	35	20.6	114	67.1
• E.D.A.S	11	6.5	3	1.8	11	6.5	25	14.7
• Overweight and Obesity	1	0.6	3	1.8	1	0.6	5	2.9
• Other pathologies	10	5.9	11	6.5	5	2.9	26	15.3
	82	48.2%	36	21.2%	52	30.6%	170	100 %
				p<0.05				
PHYSICAL ACTIVITY (1H OUT OF THE SCHOOL SCHEDULE)	**NORMAL WEIGHT (N)**	**(%)**	**OVERWEIGHT (N)**	**(%)**	**OBESITY (N)**	**(%)**	**TOTAL (N)**	**(%)**
• Yes	45	26.5	17	10.0	5	3.0	67	39.4
• No	37	21.7	19	11.2	47	27.6	103	60.6
	82	48.2%	36	21.2%	52	30.6%	170	100 %
					p<0.05			

Source: Clinical history.

In table 3, regarding the other epidemiological characteristics like the place of origin. It was found that out of a total of 170 boys and girls that treated in the pediatric office of the HospitalRegional Moquegua, 10 children (5.9%) and 22 girls(12.9%) with overweight and obesity, respectively were from the Centro Poblado Menor (C.P.M) of San Antonio. This factor had a significant relationship to overweight and obesity (p <0.05); not like other places of origin of less frequency as San Francisco, Cercado de Moquegua among others.

The educational institution more frequency of overweight patients is the State Educational Institution with 25 obese patients (14.7%) and Private Educational Institution had 27 cases of Obesity 15.9%), the last one with a statistically significant relationship (p <0.05).

At analyzing birth weight, we found 28 overweight children (16.5%) and 31 (18.2%) with obesity, in both cases, the birth weight was normal (2,500-3.999g), constituting that normal birth weight and obesity have a significant relationship (p <0.05).

The reason for the pediatric consultation of boys and girls 5-10 years old in the Regional Hospital of Moquegua during the study period were infections respiratory symptoms in children who presented overweight 19 (11.1%) and obesity 35 (20.6%). Evaluated in an outpatient clinic for an acute respiratory infection, and being diagnosed with obesity has a significant relationship (p <0.05).

Finally, we found 19 (11.2%) and 47 (27.6%) children with overweight and obesity respectively not perform physical activity for at least one hour outside of the school or kindergarten schedule, this relationship is significant (p <0.05).

Table 5. Clinical characteristics.

ACANTHOSIS NIGRICANS	NORMAL WEIGHT (N)	(%)	OVERWEIGHT (N)	(%)	OBESITY (N)	(%)	TOTAL (N)	(%)
• Yes	07	4.1	07	4.1	27	15.9	41	24.1
• No	75	44.1	29	17.1	25	14.7	129	75.9
	82	48.2%	36	21.2%	52	30.6%	170	100%
					p<0.05			
SYSTOLIC ARTERIAL PRESSURE	**NORMAL WEIGHT (N)**	**(%)**	**OVERWEIGHT (N)**	**(%)**	**OBESITY (N)**	**(%)**	**TOTAL (N)**	**(%)**
• Percentile 5 %	1	0.6	1	0.6	10	5.9	12	7.1
• Percentile 10%	19	11.2	1	0.6	9	5.3	29	17.1
• Percentile 25%	62	36.4	14	8.2	13	7.6	89	52.3
• Percentile 50%	0	0.0	17	10.0	14	8.2	31	18.2
• Percentile 75%	0	0.0	3	1.8	4	2.4	7	4.1
• Percentile 95%	0	0.0	0	0.0	2	1.2	2	1.2
	82	48.2%	36	21.2%	52	30.6%	170	100%
			p<0.05		p<0.05			
DIASTOLIC BLOOD PRESSURE	**NORMAL WEIGHT (N)**	**(%)**	**OVERWEIGHT (N)**	**(%)**	**OBESITY (N)**	**(%)**	**TOTAL (N)**	**(%)**
• Percentile 5 %	0	0.0	1	0.6	3	1.8	4	2.4
• Percentile 10%	1	0.6	1	0.6	14	8.2	16	9.4
• Percentile 25%	24	14.1	1	0.6	4	2.4	29	17.1
• Percentile 50%	57	33.5	17	10.0	14	8.2	88	51.7
• Percentile 75%	0	0.0	15	8.8	12	7.1	27	15.9
• Percentile 95%	0	0.0	1	0.6	5	2.9	6	3.5
	82	48.2%	36	21.2%	52	30.6%	170	100%
			p<0.05		p<0.05			
ABDOMINALPERIMETER	**NORMAL WEIGHT (N)**	**(%)**	**OVERWEIGHT (N)**	**(%)**	**OBESITY (N)**	**(%)**	**TOTAL (N)**	**(%)**
• Percentile 25 %	12	7.1	2	1.2	0	0.0	14	8.2
• Percentile 50%	66	38.7	7	4.1	3	1.8	76	44.7
• Percentile 75%	3	1.8	16	9.4	22	12.9	41	24.1
• Percentile 90%	1	0.6	11	6.5	27	15.9	39	23.0
	82	48.2%	36	21.2%	52	30.6%	170	100%
			p<0.05		p<0.05			
INDEX ABDOMINAL PERIMETER / SIZE	**NORMAL WEIGHT (N)**	**(%)**	**OVERWEIGHT (N)**	**(%)**	**OBESITY (N)**	**(%)**	**TOTAL (N)**	**(%)**
• 0.40-0.49	81	47.6	21	12.3	1	0.6	103	60.6
• 0.50-0.59	1	0.6	10	5.9	30	17.7	41	24.1
• ≥ 6.0	0	0.0	5	3.0	21	12.3	26	15.3
	82	48.2%	36	21.2%	52	30.6%	170	100%
					p<0.05			

Source: Clinical history.

Regarding the clinical features: Acanthosis Nigricans was presented in 7 (4.1%) children with overweight and 27 (15.9%) children with obesity. This creates a significant relationship between having Acanthosis Nigricans and Obesity (p <0.05).

Normal systolic blood pressure for age and height, occurred more frequently at the 50% percentile both in overweight and obesity, 17 (10%) and 14 (8.2%) respectively, existing in both cases a significant relationship (p <0.05). In the same way, normal diastolic blood pressure for age and height occurred more frequently at the 50% percentile both in overweight and obesity, 17 (10%) and 14 (8.2%)respectively, in both cases there is a significant relationship (p <0.05).

The abdominal perimeter was found in percentile 75% for the case of overweight children16 (9.4%) and in the 90% percentile for boys and girls with obesity 27 (15.9%); in both cases there is a significant statistic relationship between having abdominal percentile equal to or greater than the 75th percentile and overweight (p <0.05). Likewise, there is a significant statistical difference between having an abdominal perimeter equal to or greater than 90% percentile and obesity (p <0.05). The perimeter index Abdominal/ Height (P.a./T) in children evaluated with overweight is 0.40-0.49 21 (12.3%) and in children with obesity the index is 0.50-0.59 30 (17.7%), existing s significant statistical relationship between having a P.a./ T between 0.50-0.59 and obesity (p <0.05) (table 4).

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Table 5. Biochemical and image characteristics.

TOTAL CHOLESTEROL	NORMAL WEIGHT (N)	(%)	OVERWEIGHT (N)	(%)	OBESITY (N)	(%)	TOTAL (N)	(%)
• 50 th percentile	6	3.5	1	0.6	5	2.9	12	7.1
• 75 th percentile	10	5.9	1	0.6	3	1.8	14	8.2
• 90 th percentile	64	37.6	15	8.8	7	4.1	86	50.6
• 95th percentile	2	1.2	19	11.2	37	21.8	58	34.1
	82	48.2%	36	21.2%	52	30.6%	170	100%
					P<0.05			
LDL CHOLESTEROL	**NORMAL WEIGHT (N)**	**(%)**	**OVERWEIGHT (N)**	**(%)**	**OBESITY (N)**	**(%)**	**TOTAL (N)**	**(%)**
• 50 th percentile	6	3.5	2	1.2	7	4.1	15	8.8
• 75 th percentile	16	9.4	5	2.9	2	1.2	23	13.5
• 90 th percentile	59	34.7	22	13.0	7	4.1	88	51.8
• 95th percentile	1	0.6	7	4.1	36	21.2	44	25.9
	82	48.2%	36	21.2%	52	30.6%	170	100%
					p<0.05			
HDL CHOLESTEROL	**NORMAL WEIGHT (N)**	**(%)**	**OVERWEIGHT (N)**	**(%)**	**OBESITY (N)**	**(%)**	**TOTAL (N)**	**(%)**
• 50 th percentile	6	3.5	0	0.0	10	5.9	16	9.4
• 75 th percentile	17	10.0	6	3.5	4	2.4	27	15.9
• 90 th percentile	57	33.5	18	10.6	11	6.5	86	50.6
• 95th percentile	2	1.2	12	7.1	27	15.8	41	24.1
	82	48.2%	36	21.2%	52	30.6%	170	100%
					p<0.05			
TRIGLYCERIDES	**NORMAL WEIGHT (N)**	**(%)**	**OVERWEIGHT (N)**	**(%)**	**OBESITY (N)**	**(%)**	**TOTAL (N)**	**(%)**
• 50 th percentile	6	3.5	0	0.0	1	0.6	7	4.1
• 75 th percentile	15	8.8	1	0.6	2	1.2	18	10.6
• 90 th percentile	56	33	18	10.6	7	4.1	81	47.7
• 95th percentile	5	2.9	17	10.0	42	24.7	64	37.6
	82	48.2%	36	21.2%	52	30.6%	170	100%
					p<0.05			

GLUCOSE IN FASTES (MG / DL)	NORMAL WEIGHT (N)	(%)	OVERWEIGHT (N)	(%)	OBESITY (N)	(%)	TOTAL (N)	(%)
• 60-80	17	10.0	19	11.2	12	7.1	48	28.2
• 81-99	63	37.0	11	6.4	19	11.2	93	54.8
• 100-119	2	1.2	3	1.8	9	5.3	14	8.2
• 120-129	0	0.0	2	1.2	7	4.1	9	5.3
• >130	0	0.0	1	0.6	5	2.9	6	3.5
	82	48.2%	36	21.2%	52	30.6%	170	100%
			p<0.05		p<0.05			
HEPATIC ECOGRAPHY	**NORMAL WEIGHT (N)**	**(%)**	**OVERWEIGHT (N)**	**(%)**	**OBESITY (N)**	**(%)**	**TOTAL (N)**	**(%)**
• Normal	76	44.7	23	13.6	9	5.3	108	63.5
• E.H. Mild	6	3.5	6	3.5	26	15.3	38	22.4
• E.H. Moderate	0	0.0	7	4.1	16	9.4	23	13.5
• E.H. Severe	0	0.0	0	0.0	1	0.6	1	0.6
	82	48.2%	36	21.2%	52	30.6%	170	100%
					P<0.05			

Source: Clinical history.

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In table 5, regarding the biochemical characteristics and images, the total cholesterol was presented in the 90th percentile for overweight children 19 (11.2%) and in the 95th percentile for children with obesity[37] (21.8%). For the case of total cholesterol with percentile 95th, there is a significant statistical relationship with obesity (p <0.05). LDL cholesterol was presented in the 90th percentile for overweight children 22 (13%), and in the 95th percentile for children with obesity 36 (21.2%), between presenting LDL cholesterol at the 95th percentile and have obesity there is a statistically significant relationship (p <0.059). HDL cholesterol was presented in the 90th percentile for overweight children 18 (10.6%) and in the 95th percentile for children with obesity 27 (15.8%), between presenting HDL cholesterol in the 95th percentile and having obesity, there is a relationship statistically significant (p <0.05). Triglycerides were presented, at the 90th percentile for children with overweight 18 (10.6%) and in the 95th percentile for children with obesity 42 (24.7%). Between having values of triglycerides in the 95th percentile in addition to obesity, there is a statistically significant relationship(p <0.05).

Normal fasting glucose occurred between60-80mg/dl for overweight children 19 (11.2%) and between 81-99 mg/dl for children and girls with obesity 19 (11.2%), existing in both cases a standard fasting glycemia ratio and overweight or significant obesity (p <0.05). In the liver ultrasound, it was observed that it was normal for overweight children 23 (13.6%) and children with obesity 26 (15.3%) to present with steatosis mild liver disease. Having mild hepatic steatosis and obesity is statistically significant (p <0.05). In contrast, having moderate hepatic steatosis 16 (9.4%) and obesity is not statistically significant (p> 0.05).

DISCUSSION

The results of the present study points to a high prevalence of overweight and obesity in children between 5 and 10 years old attended in the consultation of the Moquegua Regional Hospital during August and December of 2017. 21.2% were overweight, and 30.6% were obese. These results infer that 51.8% have excess weight. This research allows us to show the alarming increase in prevalence in our Region of Moquegua with comparative studies at a regional level, national and world level[4,1,5]. Virtually our research reveals that 6 out of 10 children between 5 to10 years are overweight.

Regarding the epidemiological characteristics, according to sex, the literature mentions the males are the most affected to develop overweight and obesity. Our study found similar results; there is a higher frequency of male cases in comparison with the females both for overweight 20/170 (11.76%) and for obesity 40/170 (23.5%). Likewise, the group most

frequent for overweight was 6 years and for obesity 8 years[7].

The Moquegua Regional Hospital is located in the town of San Antonio (Smalltown center that has the highest density population even more than the city of Moquegua). This hospital has the most significant amount of patients that come from the Center Minor Village for both overweight and obesity constituting in both cases with a relationship of significant difference (p <0.05). It is important to mention that the Regional Hospital Moquegua serves 70% of patients affiliated with the Comprehensive Health Insurance (S.I.S). For this reason, they have patients coming from the majority of state schools. It is important to know that in our study overweight patients mostly come from state schools 25/170 (14.7%), but it is essential to understand that although it is low the percentage of patients treated did not have S.I.S. In our Hospital the highest percentage of patients with obesity come from private schools 27/170 (15.9%) the last one with a significant difference (p <0.05). At comparing with other studies, there are similarities at comparing overweight and obesity among state and private schools. In studies done in a school in Lima, a prevalence of 22% was found overweight, and 22.8% with obesity[15]. Similarly, in a survey carried out in Tacna in a private school found overweight in 26% and obesity in 39%[16].

Multiple studies relate overweight and obesity with birth weights less than 2,500g or on the contrary with birth weights of 4,000g or more[17,18]. The topic of relating birth weights to obesity is a controversial theory. In our study, on the other hand, both children that were overweight and obese had normal weight at birth ranging from 2,500g to 3,999g, in both cases with a statistical significance (p <0.05).

It is important to mention that 70% of patients that attended an outpatient clinic in the Regional Hospital of Moquegua are members of the S.I.S.. They come to the consultation with reference from their primary doctor to be treated for respiratory infections. Respiratory infections are one of the complications for overweight 19 (11.1%) p <0.05 and obesity 35 (20.6%). Only 3/170 children (1.8%) came escorted by their parent or guardian for external consultation with the diagnosis of their respective primary care doctors with overweight and obesity 1/170 children (0.6%). Physical activity equal or greater than one hour carried out by children outside school hours and/or kindergarden is low, finding overweight boys and girls 19/170 (11.2%) and 47/170 (27.6%) with obesity (p <0.05). The investigations seem to indicate that the practice of physical activity for a minimum of 60 minutes daily helps children and youth to maintain a healthy cardiorespiratory and metabolic risk profile[6,17,18].

Regarding the clinical features, as in most prevalence studies of overweight and obesity, we found a higher percentage of Acanthosis Nigricans in overweight children 29/170 (17.1%) and obese children 27/170 (15.9%), there is a statistically significant relationship (p <0.05) between having Acanthosis Nigricans and obesity. Acanthosis Nigricans is a clinical manifestation that the literature associated with hyperinsulinism. At old age, it induces insulin resistance, diabetes Mellitus and polycystic ovary syndrome[19,20,21]. Systolic and diastolic blood pressure both for overweight and obesity maintain at the 50% percentile with p <0.5.

The abdominal perimeter in our study presents 75% percentile for overweight children16/170 (9.4%) p <0.05 and 90% percentile 27/170 (15.9%)p <0.05, in obese children. The circumference of the waist or abdominal perimeter is an indicator of visceral fat. Its increase not only reflects the increase of fat but also represents an increase in subcutaneous fat22. Several works guarantee that the best indicator of anthropometric cardiovascular risk is the circumference of the waist or abdominal perimeter[23]. It is for this reason the anthropometry measurements are used for the diagnosis of overweight and obesity. The circumference of the waist or abdominal perimeter should not be missed[22,23]. Also, if we relate the abdominal perimeter with the size of the patient (abdominal perimeter index/size) we found that in overweight this index is more frequently between 0.40-0.49 21/170 (12.3%) but in obesity, it is 0-50-0.59 30/170 (17.7%) p <0.05. It is essential to compare our results with the previous studies that provide risks factors of Metabolic Syndrome in overweight children with abdominal perimeter index/size (P.a./T) <of 0.5 is 3.34 which increases the risk if these children are overweight have an index P.a./T> 0.5 to 8.4. If these children are obese and have a P.a./T index> 0.5, the risk of Metabolic Syndrome is of 12.11 which creates even higher danger[24].

The biochemical and image characteristics show that total cholesterol, LDL and HDL cholesterol, and triglycerides are elevated in obesity, all of them having a statistically significant difference (p <0.05). Only in the case of total cholesterol both in overweight and obesity are seen elevated both with p <0.05. Literature

reports increased serum levels of the lipid profile elements in obese children[24].

Fasting glucose blood levels were normal for both overweight children as well as children with obesity p <0.05. Although boys and girls who were overweight 1/170 (0.6%) and 5/170 (2.9%) obese, they do not represent a significant statistical relationship (p> 0.05).

The image studies carried out in our overweight children who seem normal compared with children with obesity show elevated frequency of mild hepatic steatosis 26/170 (15.6%) followed closely by moderate hepatic steatosis16/170 (9.4%), in the same way, is very related to other studies with similar results than our present study. Haldrin Antonio Bejarano Forqueras in his research demonstrated the relationship between obesity and the development of Non-alcoholic fatty liver disease. His study found that in the population of children with overweight and obesity there is a risk factor for liver disease. These results were diagnosed through ultrasound, presenting 60% of all children with some degree of fatty liver[25].

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CONCLUSION

The present study shows an increment in the prevalence of overweight and obesity in boys and girls from 5 to 10 years old with epidemiological, clinical, biochemical characteristics as well as imaging to develop diseases that are not transmissible as diabetes, hypertension, dyslipidemias, cancer, metabolic syndrome, and others. Overweight and obesity cause an inadequate quality of life, resulting in a public health problem and therefore increasing morbidity and mortality in our population.

Authorship contributions: The author participated in the genesis of the idea, project design, collection and interpretation ofdata, analysis of results, preparation of the manuscript, present research work .

Financing: Self-financed.

Conflict of interest: The Author declares do not to have conflict of interest.

Received: October 11, 2018

Approved: January 6, 2019

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