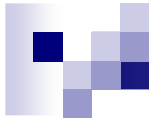


# **Prevalência e Prognóstico de Hipertensão Mascarada Detectada Através da MRPA em Crianças e Adolescentes: Estudo Arsakeion**

**Apresentado por Silvana de Barros  
na reunião da Unidade de Hipertensão  
do Hospital das Clínicas da Faculdade de Medicina  
da Universidade de São Paulo  
em 21 de Maio de 2009**

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# Prevalence and Predictors of Masked Hypertension Detected by Home Blood Pressure Monitoring in Children and Adolescents: The Arsakeion School Study

George S. Stergiou<sup>1</sup>, Vayia C. Rarra<sup>1</sup> and Nikolaos G. Yiannes<sup>1</sup>



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## BACKGROUND

Studies using ambulatory blood pressure (BP) monitoring have shown that in children and adolescents masked hypertension (MH) is not uncommon. This school-based study investigated the prevalence and the characteristics of MH diagnosed using home BP measurements.

## METHODS

A total of 765 subjects aged 6–18 years were assessed with office (two visits, six readings) and home BP measurements (3 days, 12 readings). Office hypertension was diagnosed using the US Task Force normalcy tables and home hypertension using the Arsakeion normalcy tables ( $\geq 95$ th percentile for both). White-coat hypertension (WCH) was defined as office hypertension but low home BP ( $< 95$ th percentile) and MH as home hypertension but low office BP ( $< 95$ th percentile).

## RESULTS

On the basis of office BP measurements of the first visit 3.3% of participants had MH, 5.9% WCH, and 2.7% hypertension compared to 4.2, 2.1, and 1.8%, respectively, when a two-visit-average BP was used ( $P < 0.001$  vs. first visit). Subjects with MH or WCH did not differ from hypertensives or normotensives regarding age, gender, or height. However, weight, body mass index (BMI), waist and hip circumference, and office and home BP values fell in between those of normotensives and hypertensives. Prehypertension (office BP: 90–95th centile) and increased BMI were independent predictors of MH.

## CONCLUSIONS

In children and adolescents MH detected by home BP monitoring is not uncommon and is associated with prehypertension and overweight. Repeated office measurements are essential for the precise diagnosis. MH and WCH in children appear to be intermediate phenotypes of hypertension.

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# INTRODUÇÃO

- ✓ Estudos utilizando MRPA tem demonstrado que a hipertensão  **mascarada**  é um fenômeno comum entre crianças e adolescentes.
- ✓ **Hipertensão do avental branco** está associada com risco cardiovascular comparado ao da normotensão, enquanto que a **hipertensão mascarada** apresenta risco cardiovascular similar ao da hipertensão resistente.

**Objetivo:** Investigar a prevalência de Hipertensão do avental branco, hipertensão mascarada e hipertensão resistente em crianças e adolescentes avaliadas através da MRPA e comparar as características desta população.

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# MÉTODO

**População:** Alunos com idade de 6-18 anos de um colégio de Atenas durante o ano escolar de 2004-2005, envolvendo medidas da pressão arterial de consultório e residencial (MRPA).

**Critérios de inclusão:** Crianças e adolescentes saudáveis.

**Critérios de exclusão:** doença aguda ou crônica, ou uso de medicações que afetassem os níveis de pressão arterial durante os 15 dias que antecederam o estudo.

## **Variáveis:**

- ✓ **Medida da pressão arterial de consultório:** realizada em ambiente calmo no próprio colégio por 2 médicos treinados em duas visitas (duas semanas consecutivas). Foram utilizados aparelhos oscilométricos automáticos com memória. Total de 6 leituras por participante.
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# MÉTODO

## Variáveis:

- ✓ **MRPA:** realizada pelos participantes ou pelos pais, por 3 dias seguidos entre as 2 visitas, utilizando o mesmo aparelho da medida de consultório. Forma realizadas 2 medidas pela manhã (após levantar-se e antes do café da manhã) e 2 a noite (antes do jantar), totalizando 12 leituras por participante.
  - ✓ Peso
  - ✓ Altura
  - ✓ Circunferência cintura
  - ✓ Circunferência quadril
  - ✓ Circunferência do braço
  - ✓ Informações sobre histórico médico, uso de drogas, história de hipertensão na família.
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# MÉTODO

## Classificação da Hipertensão:

- **Pressão de consultório:** Baseado na tabela de normalidade NHBPEP 2004.
    - < 90 percentil = Normal
    - 90 – 95 percentil = pré-hipertensão
    - ≥ 95 percentil = hipertensão
  - **MRPA:** Baseado na tabela de normalidade do Estudo Arsakeion
    - < 90 percentil = Normal
    - 90 – 95 percentil = pré-hipertensão
    - ≥ 95 percentil = hipertensão
  - Hipertensão do avental branco: PA consultório elevada e MRPA normal.
  - Hipertensão mascarada: PA consultório normal e MRPA elevada
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# Tabela de Normalidade

## Estudo Arsakeion

Table 1 Systolic and diastolic home blood pressure values for clinical use

Height (cm)	N	Percentiles for boys (n = 347)		N	Percentiles for girls (n = 420)	
		50th <sup>a</sup>	95th <sup>a</sup>		50th <sup>a</sup>	95th <sup>a</sup>
120–129	23	105/64	119/76	36	101/64	119/74
130–139	51	108/64	121/77	51	103/64	120/76
140–149	39	110/65	125/77	61	105/65	122/77
150–159	41	112/65	126/78	71	108/66	123/77
160–169	45	115/65	128/78	148	110/66	124/78
170–179	91	117/66	132/78	46	112/66	125/79
180–189	57	121/67	134/79	7	114/67	128/80

# Resultados

**Table 2 | Participants' characteristics according to hypertension classification (mean  $\pm$  s.d.)**

	Normotensives	White-coat hypertensives	Masked hypertensives	Sustained hypertensives
N (%)	703 (91.8)	16 (2.1)	32 (4.2)	14 (1.8)
Age (years)	12.3 $\pm$ 3.2	11.9 $\pm$ 3.9	12.3 $\pm$ 3.6	12.3 $\pm$ 3.2
Boys (%)	45	44	53	50
Family his. (%)	19	37	19	21
Height (cm)	157 $\pm$ 17	158 $\pm$ 22	157 $\pm$ 21	159 $\pm$ 20
Weight (kg)**	50 $\pm$ 17	60 $\pm$ 28	53 $\pm$ 20	65 $\pm$ 23
BMI (kg/m <sup>2</sup> )***	19.4 $\pm$ 3.4	22.6 $\pm$ 5	20.8 $\pm$ 3.8	24.7 $\pm$ 5.3
Waist circ. (cm)***	68 $\pm$ 10	76 $\pm$ 15	70 $\pm$ 12	81 $\pm$ 14
Hip circ. (cm)**	80 $\pm$ 11	87 $\pm$ 16	82 $\pm$ 13	92 $\pm$ 15
Arm circ. (cm)***	22.8 $\pm$ 3.5	25.0 $\pm$ 5	23.5 $\pm$ 3.6	26 $\pm$ 3.5
Systolic BP (mm Hg)				
Office***	109 $\pm$ 9	128 $\pm$ 10	116 $\pm$ 11	133 $\pm$ 8
Home***	109 $\pm$ 8	117 $\pm$ 8	127 $\pm$ 7	131 $\pm$ 8
Diastolic BP (mm Hg)				
Office***	63 $\pm$ 6	74 $\pm$ 6	66 $\pm$ 6	78 $\pm$ 6
Home***	65 $\pm$ 5	66 $\pm$ 5	74 $\pm$ 8	78 $\pm$ 3
Pulse rate (bpm)				
Office**	87 $\pm$ 13	97 $\pm$ 14	88 $\pm$ 14	95 $\pm$ 22
Home*	80 $\pm$ 10	81 $\pm$ 8	81 $\pm$ 11	87 $\pm$ 17

Family his, parental history of hypertension.

BP, blood pressure; BMI, body mass index; circ., circumference.

\* $P < 0.05$ ; \*\* $P < 0.01$ ; \*\*\* $P < 0.001$  for difference among subgroups.

# Resultados

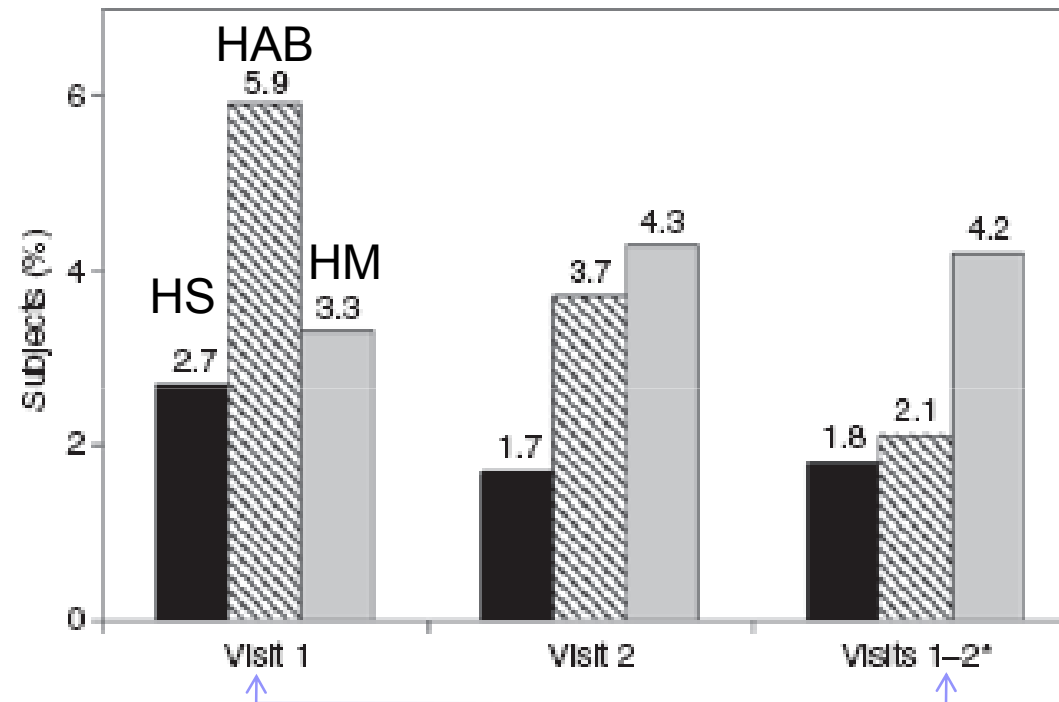
**Table 1 | Average blood pressure in the first, the second, and in both office visits**

	Office visit 1	Office visit 2	Office visits 1–2
Systolic office BP (mm Hg $\pm$ s.d.)	111 $\pm$ 11	↓ 109 $\pm$ 11*	110 $\pm$ 10*,**
Diastolic office BP (mm Hg $\pm$ s.d.)	65 $\pm$ 7	↓ 63 $\pm$ 7*	64 $\pm$ 7*,**
Pulse rate (bpm $\pm$ s.d.)	88 $\pm$ 15	86 $\pm$ 14*	87 $\pm$ 13*,**

BP, blood pressure.

\* $P < 0.01$  for difference from visit 1; \*\* $P < 0.01$  for differences from visit 2.

# Resultados



**Figure 1** | Proportions of subjects classified as sustained (black bars), white-coat (striped bars), and masked hypertensives (gray bars) on the basis of office blood pressure measurements of the first and second visits and both visits added (\* $P < 0.01$  for differences in the classification compared to visit 1).

# Resultados

**Table 3 | Independent predictors of masked hypertension in subjects with office blood pressure <95th percentile (logistic regression analysis with masked hypertension as dependent variable)**

Predictors	B	Exp(B)	<i>p</i>	95% Confidence Intervals
Prehypertension <sup>a</sup> (yes = 1)	1.4	4.3	<0.001	1.7, 10.5
Body mass index (z-score)	0.5	1.6	0.004	1.2, 2.3
Age (years)	-0.1	0.8	0.83	0.9, 1.1
Gender (male = 1)	0.3	1.4	0.35	0.7, 2.9

<sup>a</sup>office blood pressure 90–95th centile.

# Resultados

		Office BP percentile	
		< 90th	≥
BMI (z-score)	^	10/389 (3%)	2/18 (11%)
	0	14/298 (5%)	6/30 (20%)

		Office BP percentile	
		< 50th	≥
BMI (z-score)	^	0/141 (0%)	12/266 (5%)
	0	4/72 (6%)	16/256 (6%)

**Figure 2** | Prevalence of masked hypertension in children and adolescents with office blood pressure (BP) <95th centile ( $n = 735$ ) according to body mass index (BMI) (z-score) and office BP level. A z-score of 0 is taken as the threshold for BMI, and, for office BP classification, (a) the 90th or (b) the 50th centile are used.



# Conclusão

**Em crianças e adolescentes a Hipertensão Mascarada detectada através da MRPA não é incomum e está associada com pré hipertensão e sobrepeso. Repetidas medidas de consultório são essenciais para um diagnóstico preciso.**

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