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Artigo

FUNCTIONALITY EVALUATION OF SCHISTOSOMOTIC MIELORADICULOPATHY PATIENTS

AVALIAÇÃO DA FUNCIONALIDADE DE PACIENTES COM MIELORADICULOPATIA ESQUISTOSSOMÓTICA

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ABSTRACT – Introduction: Schistosomiasis is a serious public health problem in Brazil with about 16 million infected individuals. Study aim was to evaluate individuals biochemical and functional conditions with neurological impairment in Sergipe-Brazil. **Material and methods:** This is a prospective and cross-sectional study from 2015 to 2017. Casuistry totaled 72% (n = 29) of the 40 positive cases population of 106 individuals evaluated biochemically. Variables were immunocitological profile; International Functioning, Disability and Health Classification (ICF); American Spinal Cord Injury Association; Functional Individual Measure per individual (FIM™ Instrument) and Functional Individual Measure per motor tasks (enviro FIM-motor tasks™); Ashworth Scale; Rest metabolic expenditure per weight kilogramme (METs-[1]) of the Physical Activity Scale for Individuals with Physical Disabilities (PASIPD).

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Páginas 76 a 99

Temas em Saúde
Volume 21, Número 5
ISSN 2447-2131
João Pessoa, 2021

Artigo

Statistical analysis considered p<0.05 significant. **Results:** Positive serum cases were concentrated in the capital, age was 45.21 ± 15.71 years and male. Serology identified active neural lesions. Force was not compromised; however, tonus with severe deficiency. Sit-down, crouch and walk than 1 kilometer activity performance less and gait without compromise. Final scores were 111.5 ± 21.12 in FIM™ Instrument; and lower limbs enviro FIM-motor tasks™ within 50% activity. MET-^{1} total mean was 13.18 ± 11.44. Among the activities, MET-^{1} spent the most was time walking, a light activity, but spending above normal and also in comparison to others activities, with 123.66% expenditure. Moderate negative correlation between positive serology and FIM™ Instrument and enviro FIM-motor tasks™. Moderate positive correlation between tone and positive serology; however, negative weak correlation between PASIPD Walk with tonus severity-ICF. **Conclusion:** Functional impairment degree for SMR positive cases was moderate disability, but without functional performance interference.

Keywords: Functional evaluation, Myeloradiculopathy, Schistosomiasis.

RESUMO – Introdução: A esquistossomose é um grave problema de saúde pública no Brasil com cerca de 16 milhões de indivíduos contaminados. Sua forma clínica pode causar Mielorradiculopatia Esquistossomótica (MRE) apresentando déficit sensório-motor com prejuízo funcional e de qualidade de vida. O objetivo estudado foi avaliar as condições bioquímica e funcional dos indivíduos com acometimento neurológico. **Metodologia:** Trata-se de um estudo documental, prospectivo e transversal, de 2015 a 2017. A casuística foi de todos acordos em participar da pesquisa totalizando 72% (n=29) da população de 40 casos positivos dos 106 indivíduos avaliados bioquimicamente. As variáveis pesquisadas foram: perfil imunocitológico; Classificação Internacional de Funcionalidade, Incapacidade e Saúde (CIF); Associação Americana de Lesão Medular (ASIA); Medida de Incapacidade Funcional do indivíduo (MIFInd) e por atividade (MIFAtiv); Escala de Ashworth (ASH); e gasto metabólico desprendido em repouso por quilo de peso (METs-1) da Escala de Atividade Física para Pessoas com Deficiência Física (PASIPD). A análise estatística considerou p<0,05 significativo para os testes Qui-quadrado, ANOVA ONE-WAY e Correlação de *Sperman e Pearson*. **Resultados:** Os casos de soro positivo se concentraram na capital (Aracaju; 51,72%), a idade foi de 45,21±15,71 anos, com prevalência do sexo masculino (68,97%). A sorologia identificou lesões neurais ativas com proteína alterada. Na CIF a força se encontrou sem

DOI: 10.29327/213319.21.5-4
Páginas 76 a 99

Temas em Saúde
Volume 21, Número 5
ISSN 2447-2131
João Pessoa, 2021

Artigo

comprometimento (64,07%); otônus apresentou-se com deficiência grave (55,17%); a função da marcha apresentou-se sem comprometimento (72%); assim como no desempenho da atividade senta-se, agachar-se e andar menos de 1 quilômetro. Porém suas médias apontaram gravidade leve a moderada. Na MIFINd os escores final foi de 111,5±21,12; MIFAtiv em membros inferiores com atividade em 50%. A espasticidade se encontrava entre moderada e grave (2,73±1,22); e a média total dos MET^{-1} foi de 13,18±11,44. E entre as atividades, a que mais gastou MET^{-1} foi andar, uma atividade leve, porém com gasto acima do normal e em relação as demais atividades ($p<0,01$), com gasto de 123,66%. E nas correlações foi entrado correlação moderada e inversa entre sorologia positiva e MIFInd (r= -0,43, p=0,02) e MIFAtiv (r= -0,56, p=0,002); e correlação moderada positiva entre sorologia e força (r= 0,45, p=0,018) e tônus (r= 0,50, p=0,006). **Conclusão:** Foi demonstrado o grau do comprometimento funcional para os casos positivos de MRE onde apresentaram incapacidade moderada, porém sem interferência no desempenho funcional.

Palavras-Chave: Avaliação funcional, Mielorradiculopatia, Esquistossomose.

INTRODUCTION

Schistosomiasis is the most widespread parasitic infectious disease in the world, considered the second most frequent infection after malaria, and sometimes causes clinical and functional involvement in contaminated persons. It is caused by worms of *Schistosoma* genus, intermediate hosts susceptible to infection (FERRARI et al., 2008).

It is a public health issue reinforced by underreporting as in Egypt, Puerto Rico, Senegal and Mauritania. Schistosoma parasite infection affects about 200 million people living in poverty worldwide. More than 2.5 million people are at risk of contracting the disease, and 2.5 to 6 million people have been infected (TAPAN et al., 2010; LIMA et al., 2015).

According to the Ministry of Health, between the periods of 1990 and 2010, 1,567 cases of hospitalizations with 527 deaths were quantified in Brazil. Endemic focal areas cover the states of Alagoas, Maranhão, Bahia, Pernambuco, Rio Grande do Norte, Paraíba, Sergipe, Espírito Santo and Minas Gerais, prevailing in the Northeast region. Specifically in Northeast, endemic areas for schistosomiasis are distributed along the coast, extending from Rio Grande do Norte state, including hot and humid areas of the

DOI: 10.29327/213319.21.5-4
Páginas 76 a 99

Temas em Saúde
Volume 21, Número 5
ISSN 2447-2131
João Pessoa, 2021

Artigo

Paraíba, Pernambuco, Alagoas, Sergipe and Bahia states, prevailing in more than 5% in all these states, except in Rio Grande do Norte. On Sergipe state, schistosomiasis cases appear in 51 municipalities on Zona da Mata and Litoral regions, being one of the main public health problems for more than 10 years (BRASIL, 2014; LIMA et al., 2018).

Although Sergipe has a high disease prevalence, socioeconomic and environmental factors are responsible for maintenance *S. mansoni* parasite infection, and there is a shortage of recent data in the literature about the disease epidemiological situation in the State (SANTOS et al., 2016).

Due to disease magnitude on Sergipe state, it is important to know the epidemiological profile and its clinical-functional implications, as a way of reorienting actions that aimed at health promotion, disease prevention and program targeting, as a way of achieve a better life quality for the population (ROCHA et al., 2016).

Clinical manifestations are divided into acute and chronic phases, and it may develop Central Nervous System (CNS) impairment. *S. mansoni* reaches the CNS through parasite adult pairs migration or through its eggs carried through the venous flow, receiving the name Schistosomiasis Myeloradiculopathy (SMR) when it reaches the spinal cord or its roots. Patients with SMR present complications such as sensorimotor deficit, autonomic dysfunction and sphincter dysfunction that vary according to the injury degree (complete or incomplete), decreasing functionality as well as live quality (LI et al., 2011; TAPAN et al., 2010).

Decreased nerve conduction and muscle contraction physiology deficit leads to major muscle groups hypotrophy. The main affected muscle groups are in the trunk, hip and lower limbs, preventing patient from maintaining sedestation and orthostatism posture, consequently, there is a significant loss in gait speed due to muscle weakness and cardiorespiratory conditioning decrease, increasing energy expenditure to perform basic functional activities (TAKAMI et al., 2012). This justifies this work realization and originality.

MATERIAL AND METHODS

Type of study and casuistry

Prospective, cross-sectional, and evaluative study with 106 individuals with a positive diagnosis for Schistosomiasis Myeloradiculopathy (SMR) enrolled between

DOI: 10.29327/213319.21.5-4
Páginas 76 a 99

Temas em Saúde
Volume 21, Número 5
ISSN 2447-2131
João Pessoa, 2021

2010 and 2015 at Tiradentes University Biomedicine Laboratory (UNITLab), in Aracaju city, Sergipe, Brazil. For functional clinical evaluations, all positive cases (n = 40) were selected, but only 29 were found. All volunteers analyzed had their place of residence in the metropolitan area of the capital in Aracaju, east and south of the state of Sergipe, bordering the Vaza-Barris river. All analyzed volunteers presented their sites on Great Aracaju, East and South of Sergipe, bathed by Vaza-Barris River.

Ethical aspects

The study attend specific ethical and scientific foundations. Volunteers were previously informed about study procedures and objectives. They signed the Free and Informed Consent Form (FICF) in accordance with research involving human beings guidelines and regulated standards and also complies with Ministry of Health National Health Council Resolution CNS nº 466 of December 12, 2012. Tiradentes University Ethics and Research Committee/ Brazil (# 2,961,422) authorized this research.

Document Collection Procedures

Patients documentary survey with positive neuroschistosomiasis liquoric dosages was used to delineate immunocitological profile, through CSF diagnostic techniques and neuroschistosomiasis reactive individuals.

Laboratory evaluations and chemocitological exams in CSF/serum

All patients positive for neuroschistosomiasis through prior CSF analysis by medical request and anamnesis compatible with positive result were reconvened for blood collection, schistosomiasis serological and chemocitological analysis.

Immunocitological dosage

Enzymatic method was performed, observing high values in puncture accidents, blood-brain barrier permeability in inflammatory neurological diseases. Glucose; chloride; lactic acid dosage was performed. Cytological exams measuring hemocytes, leukocytes, fungi and or parasites presence through the Fucksrosental chamber. On leukocyte differential count, centrifugation was performed in cito centrifugal or

DOI: 10.29327/213319.21.5-4
Páginas 76 a 99

Temas em Saúde
Volume 21, Número 5
ISSN 2447-2131
João Pessoa, 2021

decantation through a Suta chamber and staining with panoptic dye, counting 100 cells and categorizing in percentages terms. If cell portion was low, differential count was not considered.

Functional evaluation

Functional evaluation realized on the present study in SMR was performed through functional examination, including assessments performed through protocols such as: 1- ICF, the Functionality Classification used only three of the four domains. Body domains function (b), body structure (s) in relation to strength and tone. Already in the domain performance and participation (d) was classified. Severity qualifier with no compliance (0) and total impairment (4) was used in the statistics. 2 – Individuals with FIM™ Instrument per individuals scores from 1 to 7 to measure independence, and enviro FIM-motor *tasks*™ with score from 0 to 10 referring to the walking task. 3 - PASIPD measuring metabolic expenditure at rest in the last 7 days. 4 - *Ashworth Scale* to assess muscle tone with scores between 1 and 4.

Statistical analysis

GraphPad Prism 6.01 software was used before Shapiro-Wilk test to analyze normality parametric and / or non-parametric variables studied, with after simple variance multiple comparisons analysis by One-Way or Kruskal-Wallis, followed by Tukey or Dunn's post test. For semi-quantitative variables, chi-square test was used. A significant difference was considered $p<0.05$.

RESULTS

Functional activities and research on metabolic expenditure of the individuals were performed in a biomedical reference laboratory of Sergipe / Brazil to diagnose MRS from 2010 to 2015. Functional activities and metabolic expenditure survey was performed in Sergipe / Brazil reference biomedical analysis laboratory users to diagnose SMR from 2010 to 2015.

Of the 106 cases examined in the laboratory, forty (37.74%) were positive and 66 were negative (62.26%). The number of males was significantly higher, 75% ($p < 0.01$)

DOI: 10.29327/213319.21.5-4
Páginas 76 a 99

Temas em Saúde
Volume 21, Número 5
ISSN 2447-2131
João Pessoa, 2021

Artigo

compared to women 25% (Table 1). Of 106 cases treated on the laboratory, forty cases (37.74%) were reagents and 66 were negative (62.26%). Male patients amount presented significantly higher, 75% (p <0.01), in relation to female, 25% (Table 1).

Table 1: Reactive cases incidence in schistosomiasis by sex at Sergipe state, attended by Sergipe state / Brazil reference laboratory between 2010 and 2015.

Schistosomiasis cases	**N**	**P %**
Positive	40	37,74
Negative	66	62,26*
TOTAL	106,0	100,00
Schistosomiasis cases by sex	**N**	**%**
Male	30	75,00**
Female	10	25,00
TOTAL	40,0	100,00

Legend: Relative frequencies (%); Chi-square test; *p<0.05; **p<0.01; ***p<0.001.

Among the cities, Aracaju, the state capital, had a significant prevalence (51.72%), followed by Estância, Laranjeiras, Itaporanga D'Ajuda, Barra dos Coqueiros and Socorro (Table 2). Among prevalence, Aracaju was significant (51.72%), followed by Estância, Laranjeiras, Itaporanga D'Ajuda, Barra dos Coqueiros and Socorro (Table 2).

DOI: 10.29327/213319.21.5-4
Páginas 76 a 99

Temas em Saúde
Volume 21, Número 5
ISSN 2447-2131
João Pessoa, 2021

Artigo

Table 2: Neuroschistosomiasis positive cases prevalence treated and clinically and functionally evaluate at a reference center in Aracaju city in the years 2010 to 2015.

Great Aracaju counties, east and south of Sergipe	N	P %
Estância	9	31,03
Aracaju	15	51,72***
Laranjeiras	1	3,45
Itaporanga d'Aguda	1	3,45
Barra dos Coqueiros	1	3,45
Socorro	1	3,45
São Cristovão	1	3,45
TOTAL	29	100,00

Legend: Relative frequencies (%); Chi-Square test considering *p<0,05, **p<0,01, ***p<0,001.

Table 3 shows chemocitology values to confirm positive diagnosis for schistosomiasis showing that only proteins and red blood cells were altered significantly above values. Glucose, Chlorides, Lactic Acid, Leukocytes, Neutrophils, Lymphocytes, Eosinophils, Reticulocytes, Plasmocytes and Gram Bacterioscopy were found without significant alterations. Protein presented a significant increase, 61, 45 mg / dL in 58.33% of individuals (p <0.001), relative to its reference value; Glucose presented normal in a considerable number of people, 65.22% (p <0.001); however, 34.78% were altered with 57.73 mg / dL on chemocitology. Chloride and lactic acid were both increased (p <0.05). Chloride presented with 132.0 mEq / L in 14.29% and lactic acid with 2.65 mmol / L in 25% of individuals. Leukocytes were altered in 23.08% with 14.20 mm3. Red blood cells were high in 53.85% with 188.5 mm3 (p <0.001). Lymphocytes were altered in 40% of people with 90.24% (p <0.001) (Table 3). Neutrophils, monocytes, eosinophils, reticulocytes, plasma cells, and bacterioscopy were not altered in relation to the reference value.

DOI: 10.29327/213319.21.5-4
Páginas 76 a 99

Temas em Saúde
Volume 21, Número 5
ISSN 2447-2131
João Pessoa, 2021

Artigo

Table 3: Frequency and mean of chemocitology reference values for reactive cases for schistosomiasis on Sergipe state attended by UNITLab between 2010 and 2015.

Schistosomiasis positivity chemocitology

	Reference limit	*Relative frequency*	*Chemocitology mean values/ p value*
Proteins	Above	58,33	61,45 mg/dL***
	Normals	41,67	31,70 mg/dL
Glucose	Altered (low)	34,78	40,00 mg/dL
	Altered (high)		101,60 mg/dL
	Normals	65,22***	57,73 mg/dL
Chlorides	Altered (high)	14,29	132,00 mEq/L*
	Normals	85,71***	124,30 mEq/L
Lactic acid	Altered (high)	25,00	2,65 mmol/L*
	Altered (low)		1,10 mmol/L
	Normals	75,00	1,48 mmol/L
Leukocytes	Altered (high)	23,08	14,20 mm^3**
	Normals	76,92***	0,36 mm^3
Red blood cells	Altered (high)	53,85	188,50 mm^3***
	Normals	46,15	0,00 mm^3
Neutrophils	Altered (high)	10,00	11,00 %
	Altered (low)	-	-
	Normals	90,00	0 %
Lymphocytes	Altered (high)	40,00	90,24 %***
	Altered (low)		0,00 %
	Normals	60,00	54,00 %
Monocytes	Altered (low)	100,00	6,30 %
	Altered (high)	0,00	-
	Normals	0,00	0,00 %
Eosinophils	Altered (low)	10,00	-
	Altered (high)		11,00 %
	Normals	90,00	0,00 %
Reticulocytes	Altered	0,00	0,00 %

DOI: 10.29327/213319.21.5-4
Páginas 76 a 99

Temas em Saúde
Volume 21, Número 5
ISSN 2447-2131
João Pessoa, 2021

Artigo

	Normals	100,00	0,00 %
Plasmocytes	Altered	0,00	0,00 %
	Normals	100,00	0,00 %
Gram bacterioscopy	Presents	0,00	0,00 %
	Absents	100,00	100,00 %

Legend: For averages, Student's t test was applied in altered and normal values; in addition to relative frequencies (%); Chi-Square test was used, considering *p<0.05, ** p <0.01, *** p <0.001.

ASIA Classification, Table 4, showed that no individual had complete lesions (ASIA A, 0%); 13.79% with incomplete lesions (ASIA B) with S4-S5 sacral sensitivity; incomplete lesions (ASIA C) with preserved motor functions in more than half of the strength three degrees muscles, but without overcoming severity (17,24%); incomplete lesions (ASIA D) with preserved function overcoming gravity severity in more than half of the muscles and strength three degree; and 62.07% in incomplete lesions, but normal motor and sensory functions (ASIA E).

Table 4: ASIA neurological impairment classification of the Neuroschistosomiasis positive cases treated at a reference center in Aracaju city from 2010 to 2015.

FUNCTIONAL CLINICAL VARIABLES	***RELATIVE FREQUENCY***
ASIA	%
A	0
B	13,79
C	17,24
D	6,89
E	62,07

Legend: Relative frequencies (%).

Cases with positive diagnosis for SMR were also evaluated in relation to their functionality and variables, which could influence motor response and metabolic expenditure.

When classified in its functionality by the International Classification of Functionality (ICF), it was found for force domain function (b7303) in lower limbs who

DOI: 10.29327/213319.21.5-4
Páginas 76 a 99

Temas em Saúde
Volume 21, Número 5
ISSN 2447-2131
João Pessoa, 2021

presented with 64.07% without compromising, followed by moderate to severe deficiency. In tonus domain (b7353) in lower limbs there was a prevalence of severe deficiency with 55.17%, followed by moderate, mild and total deficiency. In gait function domain (b770), it was observed that 72% presented without impairment followed by total, moderate, mild and severe deficiency. Performance domain evaluated sitting (d4103), crouching (d4101) and walking less than 1km (d4500) activities, with no impairment for those three activities, followed by moderate, total, and mild to sit down, respectively. In the crouching, commitment was total, moderate, severe and mild; and to walk less than 1km, the commitment was total, mild and moderate (Table 5).

Table 5: Disability severity prevalence according to International Classification of Functionality Domains Schistosomiasis Myeloradiculopathy positive cases attended and evaluated clinically and functionally at a reference center in Aracaju city over the years 2010 to 2015.

	% Deficiência				
Domaíns	***No commitment***	***Mild***	***Moderate***	***Severe***	***Total***
Lower limbs tonus (b7353)	10,34	6,90	24,14	55,17	3,45
Lower limbs strength (b7303)	64,00	4,00	16,00	16,00	0,00
Paraplegic gait (b770)	72,00	4,00	8,00	4,00	12,00
Sit down (d4103)	72,00	4,00	12,00	0,00	12,00
Crouching (d4101)	72,00	4,00	8,00	4,00	12,00
Walk <1Km (d4500)	72,00	4,00	4,00	0,00	20,00

Legend: Relative frequencies (%).

Table 6 shows that deficiency mean was below moderate (Deficiency = 2) for all the ICF surveyed variables. In strength function domain the deficiency was mild as well as in the sit down and crouch performance domain. Tonus domain function was from mild

DOI: 10.29327/213319.21.5-4
Páginas 76 a 99

Temas em Saúde
Volume 21, Número 5
ISSN 2447-2131
João Pessoa, 2021

to moderate, as well as in the gait function domain and gait performance less than 1 km (mild = 1 and moderate = 2).

Table 6: Schistosomiasis Myeloradiculopathy positive cases variable average scores linked to functional clinical evaluation mean and standard deviations attended in a reference center at Aracaju city from 2010 to 2015.

CIF CLINICAL FUNCTIONAL VARIÁBLES		***DEFICIÊNCY/INABILITY (average ± standart derivation)***
ICF FUNCTION GRADE	Strength function MMII	0,827±1,16
	Tonus function MMII	1,72±0,79
	Gait function	1,172±1,53
ICF PERFORMANCE GRADE	Sit down	0,79±1,34
	Crouch down	0,82±1,39
	Walk <1Km	1,24±1,70

FIM^{TM} Instrument, both individual and task, despite being little used in Brazil, studies have been shown their importance in disability evaluation on people with spine injuries [14-15], FIM^{TM} Instrument average was 111,5 ± 21,12, while the task average was 5.07 ± 3.2, a value corresponding to only 50% of the total capacity, that is, performed with supervision, whose total value is 10. While when evaluate by ASH scale, the mean was 2.83 ± 1.26, corresponding to moderate to severe spasticity (ASH = 2 and 3). In relation to spasticity corporal dimidio, there was no predominance in left or right side. It is probably the reason for enviro FIM-motor *tasks*^{TM} have only 50% of functional capacity per task (5.07 ± 3.2). In addition, for metabolic expenditure, the overall mean of all activities in the group was 13.18 ± 11.44 (Table 7).

DOI: 10.29327/213319.21.5-4
Páginas 76 a 99

Temas em Saúde
Volume 21, Número 5
ISSN 2447-2131
João Pessoa, 2021

Artigo

Table 7: Schistosomiasis Myeloradiculopathy mean and standard deviations of variables scores average linked to positive cases evaluate functional and clinically attended in a reference center at Aracaju city from 2010 to 2015.

CLINICAL FUNCTIONAL VARIÁBLES	***DEFICIÊNCY/INABILITY (average ± standart derivation)***
MIF per individuals	111,5±21,12
Enviro FIM-Motor *Tasks*™	5,07±3,2
Total ASH	2,83±1,26
Left ASH	2,93±1,3
Right ASH	2,73±1,22
Geral METS (PASIPD)	13,18±11,44

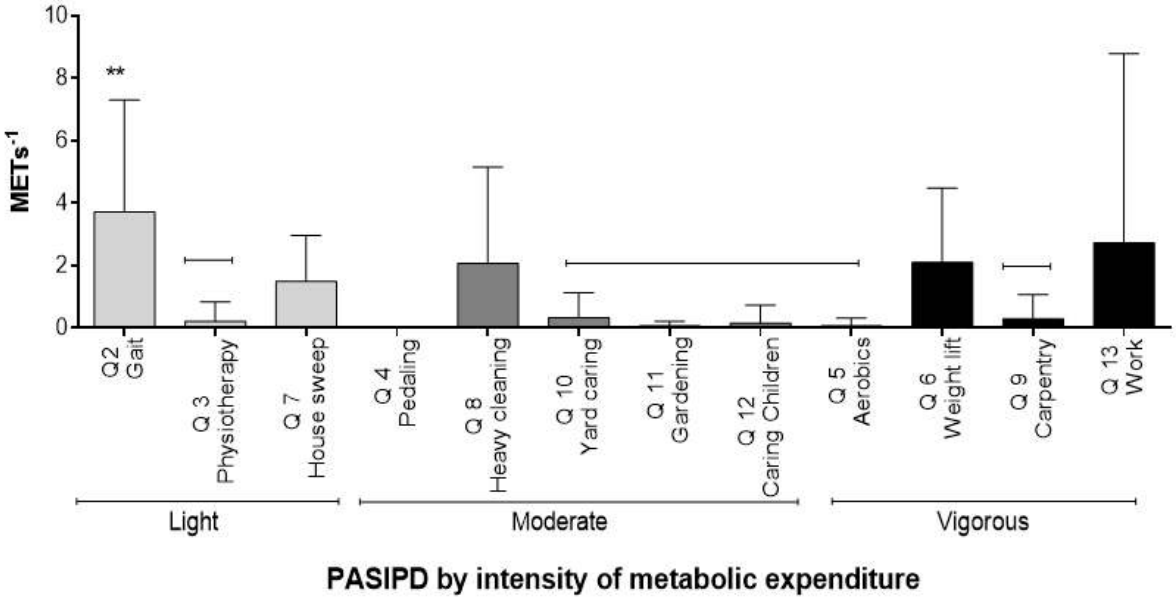
In figure 1 few $METs^{-1}$ were obteined by activities. However, in gait activity, individuals with neuroschistosomiasis spent more than the mean $METs^{-1}$ 3.71 ± 3.58, meaning 123.66%, that is, almost 24% more metabolic expenditure (Table 7). In physiotherapy spent 0.21 ± 0.61 $METs^{-1}$; pedaling 0,00 ± 0,00; aerobics 0.06 ± 0.24; weight lift 2.09 ± 2.37; house sweep 1.48 ± 1.48; heavy cleaning 2.05 ± 3.09; carpentry 0.28 ± 0.77; yard caring 0.32 ± 0.79; gardening 0.05 ± 0.15, caring children 0.15 ± 0.58 and at work 2.73 ± 6.05.

DOI: 10.29327/213319.21.5-4
Páginas 76 a 99

Temas em Saúde
Volume 21, Número 5
ISSN 2447-2131
João Pessoa, 2021

Artigo

Figure 1: METs^{-1} average per activity according to metabolic expenditure intensity of Schistosomiasis Myeloradiculopathy positive cases treated in a reference center at Aracaju city from 2010 to 2015, evaluated clinically and functionally.



Legend: One-way ANOVA test with Tukey post-test, where * p <0.05, ** p <0.01 and *** p <0.001.

Continuing about metabolic expenditure, all activities overall averages somatory group was 13.18 ± 11.44 in a possibility, at most 74.1 and at least 48 METs^{-1} of metabolic expenditure, adding up all maximum and minimum values reference by intensity of activity and hours per week. Specific expenditures per intensity of activity are shown in table 8.

DOI: 10.29327/213319.21.5-4
Páginas 76 a 99

Temas em Saúde
Volume 21, Número 5
ISSN 2447-2131
João Pessoa, 2021

Artigo

Table 8: Metabolic expenditure per METs^{-1} quantitative and percentage according to Neuroschistosomiasis positive cases reference values and intensity, attended in a reference center at Aracaju city, from 2010 to 2015.

Intensity of activity	*Realized activity*	*METs^{-1}*	*METs^{-1} reference value (daily in the last 7 days)*	*% Performed*
MILD	Walk	3,71	<3	123,66
	Physiotherapy	0,21		7
	House sweep	1,48		49,34
MODERATE	Pedaling	0	3-5,9	0
	Heavy cleaning	2,05		34,74
	Gardening	0,32		5,42
	Yard caring	0,05		0,84
	Children carring	0,15		2,54
SEVERE	Aerobics	0,06	6-9	0,67
	Weight lift	2,09		23,48
	Carpentry	0,28		3,14
	Work	2,73		30,67
TOTAL	-	13,13	48 - 74,1	-

Table 9 showed a moderate negative significant correlation between serology and FIM^{TM} Instrument, showing that higher is the positive serology, lower is the scores, that is, the greater is functional disability ($r = -0.43$, $p = 0.023$) and performance incapacity in FIM-motor tasks^{TM} ($r = -0.56$, $p = 0.002$). There was also a moderate correlation, now positive, for tone and positive serology, that is, higher the values, more tonus increased (muscular spasticity) individual had ($r = 0.5$, $p = 0.00$). On the other hand, PASIPD Walk showed negative correlation with tonus severity-CIF ($r = -0.47$, $p = 0.01$).

DOI: 10.29327/213319.21.5-4
Páginas 76 a 99

Temas em Saúde
Volume 21, Número 5
ISSN 2447-2131
João Pessoa, 2021

Artigo

Table 9: Correlation between positive serology and tonus severity according to Functionality International Classification versus Schistosomiasis Myeloradiculopathy positive cases functional evaluation attended in a reference center at Aracaju city, from 2010 to 2015.

Funcional variables Vs.	***Serology***		***Tonus severity (CIF)***	
	R	***p***	***r***	***P***
FIM™ Instrument	-0,43	0,02*	0,1	0,8
Enviro FIM-motor *tasks*™	-0,56	0,00**	-0,96	< 0,00***
PASIDP Walk	-0,2	0,31	-0,47	0,01*
Tonus (ICF)	0,5	0,00**	-	-

Legend: *Spearman test (r)*; or *Pearson Value (p)* presenting weak correlation (0 - 0.39), moderate correlation (0.4 - 0.6) and strong correlation (0.7 - 1.0); *P* value <0.05.

DISCUSSION

This study evaluated the findings of biochemical changes and functional conditions of individuals, particularly males, who had been diagnosed with myeloradiculopathy schistosomotic. Laboratory and functional were evaluated findings in order to present individuals biochemical changes and functional conditions, mainly males, who were evaluated in a reference center at Sergipe state / Brazil.

Most of the cases were concentrated in the capital, considered with high endemicity (above 15%). Similar results were found in Alagoas state reported between 2010 and 2014, with incidence of 70 cases (ROCHA et al., 2016), also in males (SANTOS et al., 2016). Besides Sergipe, other states are also in high endemicity condition like Bahia, Pernambuco and Minas Gerais.

In Sergipe, the large area of Aracaju on the Vaza-Barris River has a high parasitic load, which in turn is influenced by contact with water, reflecting the population's socioeconomic and cultural conditions; and it should be noted that the morbidity of the disease, may harm cognition of infected patients, intellectual development and damage to the functionality (LIMA et al., 2015). Under these conditions, a strategy to control the spread of this endemic disease is suggested through parasitological examinations. In this condition, it is suggested a strategy to control the spread of this endemic disease with

DOI: 10.29327/213319.21.5-4
Páginas 76 a 99

Temas em Saúde
Volume 21, Número 5
ISSN 2447-2131
João Pessoa, 2021

parasitological examinations (ROLLEMBERG et al., 2011; BRASIL, 2014; GOMES et al., 2016). In Sergipe, the greater Aracaju area bathed by Vaza-Barris River, presents high parasitic load, which in turn is influenced by contact with water, reflecting population socioeconomic and cultural conditions population; and it should be noted that the disease morbidity leads to infected patients cognition, intellectual development and functionality damages (LIMA et al., 2015).

Of 106 evaluated individuals, 37.74% presented positivity for myeloradiculopathy involvement by *S. Mansoni*. [9] identified 55.3% of cases of myeloradiculopathy involvement by *S. mansoni* in 56 patients. According to Carod-Artal (2008), neuroschistosomiasis prevalence ranges from one to 5%, with a CNS immune and inflammatory response (FERRARI; GAZZINELLI; CORRÊA-OLIVEIRA; 2008), triggering symptoms such as lower limb muscle weakness and sensory loss (LI et al, 2011).

Larocca et al (2004) and Carod-Artal (2008) report that neural lesions that are active due to neuroschistosomiasis are accompanied by CSF inflammation and consequently high erythrocytes and proteins associated with pleocytosis. Moreover, as the inflammatory process is reduced, the protein concentration is reduced. Consistent with this paper with high protein and erythrocyte findings. However, pleocytosis was not prevalent, but altered, with a considered percentage of these alterations. Although neurological symptoms and potential exposure to Schistosoma infection in some cases are not detected by Schistosoma eggs. In this condition, we suggest CSF serum antibodies specificity index and Schistosoma real-time polymerase chain reaction (PCR) (HARTER et al., 2014).

These results may justify some functional findings on present study, demonstrating impairment that correlated positivity serology with tonus impairment, and individual independence and their activities execution. Even so, these variables, when measured apart, showed without much commitment.

These investigated individuals were classified by ASIA as incomplete lesions, mostly. This classification allows delimiting neurofunctional impairment. ASIA classification presents important value for prognostics. Allowing for patient better orientation; in addition to accurately defining the level and degree of the patient's deficit. Consequently, a better adjustment in treatments and therapy directed to the individual needs (ROBERTS; LEONARD; CEPELA, 2017).

Joshi et al (2010) reported that despite the fact that serology was inconclusive; the patient that presented worsening of flaccid paraplegia, schistosomiasis immunoglobulin

DOI: 10.29327/213319.21.5-4
Páginas 76 a 99

Temas em Saúde
Volume 21, Número 5
ISSN 2447-2131
João Pessoa, 2021

antibody was a high, with a moderate fluorescent intensity, as well as positivity for Falcon antibody assay and immunoenzymatic assay for *S. mansoni*. In ASIA classification was identified as ASIA C, contributing to a better impairment diagnosis. For Roberts; Leonard; Cepela (2017), the inclusion of neurological lesions level in its classification defines with more precision the injury level.

Another classification used for neurofunctional impairment, identified by disability, is ICF. According to this classification, it was observed that although more than half of participants presented total disability with pathological tonus, referring to muscular spasticity, these individuals did not present deficiency for the walking task, both in function domain. Since ICF, people with spinal cord injuries only evaluates performance and not the pathological patterns that con accompany it. However, in the performance domain, where activity and participation are evaluated, it was noticed that walking less than 1 km concentrated a higher relative frequency in severity qualifier. This severity classification is possible because ICF is able to contemplate function and performance domain changes, favoring a broad individual contextualization (FARO, 2006; SILVA et al, 2012).

Considering a functional classification validated instruments association a more complete way to evaluating patients about their performance, it is possible that all this scores interpretive language transform medical clinic evaluation criteria associating with myeloradiculopathy patients protocols functionality scores evaluations (PIMENTA et al, 2010). Thus, was it is noted with these study that patients functionality evaluation with scores association, result in a better contributes of achieving a better prognosis and consequent treatment for schistosomal myeloradiculopathy patients.

FIM^{TM} Instrument functional evaluation, both individual and task, was found for both a negative correlation with positive serology for neuroschistosomiasis. Thus, demonstrating that functional independence is more compromised greater is serological positivity. A similar case was found in relation to tonus impairment, better discussed below.

Besides that, in this study, it was also investigated whether the influence between these activities performance, as well as the daily ones, corresponds to energy availability that is essential for voluntary muscle contraction in strength training, as well as in cases of damage to Central Nervous System. This concept is agreed with Robinson et al. (2013).

This paper; METs-^{1} amount, measured at rest, measured in hours, for seven days, corresponding to maximum daily score for each activity of a healthy person (182.3 METs^{-1}); did not take into account patient age and neither injury time, since published works

DOI: 10.29327/213319.21.5-4
Páginas 76 a 99

Temas em Saúde
Volume 21, Número 5
ISSN 2447-2131
João Pessoa, 2021

consider only METs^{-1} expenditure. Normal maximum score has values that are much higher than those found here, where they correspond to less than 50% of the values per activity, since metabolic syndrome increases with longer injury time, as well as nutrition can also influence METs^{-1} expenditure (TAKAMI et al, 2012; KHALIL et al., 2013).

Mendes et al. (2018) and Department of Health and Human Services (2018) report that although METs^{-1} are commonly used in epidemiological studies, to define mild, moderate and vigorous physical activity, they are not gold standard in relation to this intensity. Thus, they suggest adjustments of 4.9 METs^{-1} for moderate activity instead of 5.9. In this context, it is observed that individuals gait evaluated, spent more than 100% for its accomplishment; however, other activities were performed infrequently during the last seven days, generating very low metabolic expenditure over reference values. According to Department of Health and Human Services (2018), daily demands physical activity throughout the day, and activities with expenses less than 1.5 METs-^{1} is considered sedentary. This profile was observed in this study. Probably because of difficulty to performing activities by spastic muscles, presented here.

Metabolic expenditure reduction during exercise in the spastic muscles is due to type II glycolytic fibers, responsible for fast contractions and to initiate contraction. While normal muscle recruits primarily type I fibers, which in their reduction leads to a decrease in oxidative metabolism and a low resistance to aerobic exercise. On the other hand, the high energy cost presented by spastic hemiplegic individual during daily life activities can contribute to fatigue, dyspnea and muscle weakness, leading to a sedentary lifestyle, depression, anxiety and deconditioning (DE GROOT et al, 2016; SALMELA, 2000).

Still in the metabolic context, energy amount to be used in activity depends on mitochondria quantity. There mitochondria reduction in pre-synaptic nerve endings and postsynaptic space increase, which justifies muscular activity decrease. Extracellular matrix volume increase is associated with an increase in its passive stiffness in muscle tissue, found here, with severity of function for muscle tonus. Another result demonstrated here was the evidenced an inverse correlation between tonus increase and neuroschistosomiasis positive serology. For Robinson et al. (2013) there is negative correlation between rigidity and metabolic activity, which mean, greater is muscle stiffness, also known as muscle spasticity, lower is metabolic activity. In the present study, Ashworth Scale mean values presented moderate to severe spasticity, thus demonstrating a metabolic expenditure characteristic low production.

This scientific work is considered as contributor to a commitment better understanding, since it associates functional scores in schistosomal myeloradiculopathy patients.

DOI: 10.29327/213319.21.5-4
Páginas 76 a 99

Temas em Saúde
Volume 21, Número 5
ISSN 2447-2131
João Pessoa, 2021

Artigo

It was concluded that not all individuals referred for schistosomiasis diagnosis were positive. Positive reagents were mostly male and resident in capital. In chemocitological findings, red blood cells and proteins were predominantly altered. Glucose, Chloride, Lactic Acid, Leukocytes and Lymphocytes were also altered, but not prevalently. In neurofunctional findings, individual's independence was below normal, activities performed only 50% of the execution (performed with supervision). Spasticity was moderate to severe. Moreover, high metabolic expenditure to walk and little execution in other activities.

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João Pessoa, 2021

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Páginas 76 a 99

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Páginas 76 a 99