Research Paper Sport Science

Adolescents' Health Literacy Level of Muscle Atrophy Due Physical, Medical and Exercise Factors

Bebeley Samuel Joseph (PhD Scholar, Shanghai University of Sport-China), Lecturer, Department of Human Kinetics and Health Education, School of Education, Njala University, PMB Freetown, Sierra Leone

ABSTRACT

Study Focus: This study aimed at evaluating adolescents' health literacy level of muscle atrophy due physical, exercise and medical factors with one hundred and twenty participants (n=120) of mean and standard deviation age 16.5±3.5 ranged from 13-20 years sampled using the systematic random sampling method, with variables tested at One-sample t-Test of IBM-SPSS Version 23.

Results: The Comparative analysis from the test showed significance difference in scores for all tested variables with pre-test and post-test t-scores of 08.531-&-26.202 in table 2; 13.712-&-49.239 in table 4, and 11.116-&-20.281 in table 6 @ *p<0.000 2-tailed significance level with test-value of 0.05.

Conclusion: There was a significant difference between pre-test and post-test scores for all tested variables as evidenced also in their mean scores, percentages, frequencies and 95% confidence interval difference scores.

Recommendation: It is recommended that, health literacy is taught in schools during health and physical education classes.

KEYWORDS Muscle Atrophy, Physical Factor, Medical Factor and Exercise Factor

Introduction:

Muscle atrophy is a decrease in the mass of the muscle; it can be a partial or complete wasting away of muscle, and is most commonly experienced when persons suffer temporary disabling circumstances such as being restricted in movement and/or confined to bed as when hospitalized, *Sandri, M. (2008).* During aging, there is a gradual decrease in the ability to maintain skeletal muscle function and mass, a condition called sarcopenia, *Jacki, B. (2007).* The exact cause of sarcopenia is unknown, but it may be due to a combination of the gradual failure in the satellite cells which help to regenerate skeletal muscle fibers, and a decrease in sensitivity or the availability of critical secreted growth factors, which are necessary to maintain muscle mass and satellite cell survival, *Jacki, B. (2007).* Muscle atrophy results from a co-morbidity of several common diseases such as cancer, HIV/AIDS, congestive heart failure, COPD (chronic obstructive pulmonary disease), renal failure, and severe burns. Moreover, starvation eventually leads to muscle atrophy, *Sandri, M. (2008).* Disuse of the muscles, such as muscle tissue being immobilized or unused for even a few days due to primary injury of an immobilized broken bone (set in a cast or immobilized in traction), will also lead rapidly to disuse atrophy. Minimizing such occurrences as soon as possible is a primary mission of occupational and physical therapists employed within hospitals working in co-ordination with orthopedic surgeons, *Sandri, M. (2008).* Neurogenic atrophy, which has a similar effect, is muscle atrophy resulting from damage to the nerve, which stimulates the muscle, causing a shriveling around otherwise healthy limbs. Also, being in an environment without exercise will lead to atrophy, partially due to the smaller amount of exertion needed to move about, and the fact that muscles are not used to maintain posture, *Sandri, M. (2008).* In a similar effect, patients with a broken leg joint undergoing as little as three weeks of traction can lose enough back and buttocks muscle mass and strength as to have difficulty sitting without assistance, and experience pain, stress and burning even after a very short ten-minute exposure, when such positioning is contrived during recovery, *Sandri, M. (2008).* Modern medicine's understanding of the quick onset of muscle atrophy is a major factor behind the practice of getting hospitalized patients out of bed and moving about as active as possible as soon as is feasible, despite sutures, wounds, broken bones and pain, *Sandri, M. (2008).* This study only aimed at evaluating adolescents' health literacy level of muscle atrophy due physical factors, medical factors and exercise factors, cased at University Secondary School [**USS**], Njala Sierra Leone.

Materials and Methods

***Participants for the Survey*:**

The research was conducted mainly on high school pupils, 45.8% (n=55) from **Level 1-2** and 54.2% (n=65) from **Level 3-4,** with a sampled size of one hundred and twenty (**n=120**), a mean and standard deviation age of **16.5±3.5** ranged from **13-20** years, were selected adopting the process of systematic random sampling method of selection.

Data Collection Survey Instrument:

The survey questionnaire designed for adolescents' health literacy level evaluation (SQAHLE) was adopted and pre-tested as a preferred research instrument for testing the parameters on fifty pupils (n=50) from the UCC Secondary School Bo, using the test retest ANOVA technique producing a high intra-class correlation coefficient reliability ranged from *0.78-0.85,* which was previously used by *Bebeley, S. J. (2016).*

***Data Collection Procedure*:**

The one hundred and twenty participants (n=120) sampled, were instructed by the researcher to only mark a simple **'[0] for No'** and a simple **'[1] for Yes'** against each of the option variables during the pre-test, and also for the post-test evaluation immediately after a period of ten (10) minutes' interval of health literacy briefing regarding the specific variables under research, on the school's premise adopting the classroom face-to-face method of measurement and evaluation.

Data Analysis:

The frequency, percentage, standard deviation, mean, 95% confidence interval difference and One-Sample t-Test from IBM-SPSS Version 23, were used to compute, analyze and compare the results from the tested variables regarding health literacy. The results were tested **@** 2-tailed significance level of ***p<0.000** with test-value of *0.05*.

Presentation of Results:

Table 1: Adolescents' Muscle Atrophy Health Literacy Level Due Physical Factors [n=120]

Do you Know that Muscle Atrophy Due Physical Factors can be Linked to:	Pre-Test		Post-Test	
	n	%	n	%
Accident Risk in Walking?	33	28	87	73
Inclusion of Body Myositis?	24	20	96	80
Bone Fracture?	42	35	78	65
Increased Falling Risk?	35	29	85	71
Severe Burns?	22	18	98	82
Body Wounds?	21	18	99	83
Total	177	148	543	453

Table 2: One-Sample t-Test for Muscle Atrophy Due Physical Factors [n=120]

Vab. (V)	Freq. (F)	Mean Scores	Std. Dev.	t-Test Scores	2-tailed Sig.	95%CID Lower	Upper
Pre-Test	177	29.5000	8.45577	08.531	0.000	20.5762	38.3238
Post-Test	543	90.5000	8.45577	26.202	0.000	81.5762	99.3238
Total	720	120.0000	16.91154	34.733	0.000	102.1524	137.6476

Note: 95%CID = 95% Confidence Interval Difference; df=5; n=6; Test-Value=0.05; Vab=Variable

Table 3: Adolescents' Muscle Atrophy Health Literacy Level Due Medical Factors [n=120]

Do you Know that Muscle Atrophy Due Medical Factors can be Linked to:	Pre-Test		Post-Test	
	n	%	n	%
Chronic Obstructive Pulmonary Disease?	25	21	95	79
Body Cancer and HIV/DIDS?	20	17	100	83
Congestive Heart Failure?	30	25	90	75
Liver Failure?	32	27	88	73
Renal/Kidney Failure?	28	23	92	77
Imbalance Protein Synthesis & Degradation?	22	18	98	82
Total	157	131	563	469

Table 4: One-Sample t-Test for Muscle Atrophy Due Medical Factors [n=120]

Vab. (V)	Freq. (F)	Mean Scores	Std. Dev.	t-Test Scores	2-tailed Sig.	95%CID Lower	Upper
Pre-Test	157	26.1667	4.66548	13.712	0.000	21.2205	31.0128
Post-Test	563	93.8333	4.66548	49.239	0.000	88.8872	98.6795
Total	720	120.0000	9.33096	62.951	0.000	110.1077	129.6923

Note: 95%CID = 95% Confidence Interval Difference; df=5; n=6; Test-Value=0.05; Vab=Variable

Table 5: Adolescents' Muscle Atrophy Health Literacy Level Due Exercise Factors [n=120]

Do you Know that Muscle Atrophy Due Exercise Factors can be Linked to:	Pre-Test		Post-Test	
	n	%	n	%
Disuse of Muscles?	35	29	85	71
Lack of Exercise?	45	38	75	63
Prolonged Illness in Bed?	50	42	70	58
Immobilized Broken Bone?	55	46	65	54
Old Age in Adults?	40	33	80	67
Hunger and Starvation?	30	25	90	75
Total	255	213	465	388

Table 6: One-Sample t-Test for Muscle Atrophy Due Exercise Factors [n=120]

Vab. (V)	Freq. (F)	Mean Scores	Std. Dev.	t-Test Scores	2-tailed Sig.	95%CID Lower	Upper
Pre-Test	255	42.5000	9.35414	11.116	0.000	32.6334	52.2666
Post-Test	465	77.5000	9.35414	20.281	0.000	67.6334	87.2666
Total	720	120.0000	9.33096	62.951	0.000	110.1077	129.6923

Note: 95%CID = 95% Confidence Interval Difference; df=5; n=6; Test-Value=0.05; Vab=Variable

Discussion of Results:

In relation to the simple loss of muscle mass (atrophy), or the age-related decrease in muscle function (sarcopenia), there are other diseases, which may be caused by structural defects in the muscle (muscular dystrophy), or by inflammatory reactions in the body directed against muscle (the myopathies), *Jacki, B. (2007).*

The comparatively analysed results from the grouped frequency level of respondents' health literacy of all tested variables between the pre-test and post-test simple marking of [(0) for No] and [(1) for Yes] evaluation process for muscle atrophy due physical factors, as computed, analysed and slated in table two, medical factors, as computed, analysed and slated in table four and exercise factors, as computed, analysed and slated also in table six, showed a significance difference in their respective grouped scores.

The significant difference in the t-Test scores and 95% confidence interval difference scores clearly recorded between the pre-test and the post-test results, indicated very rigidly the low level of adolescents' health literacy in muscle atrophy with a precise reference to the tested variables among the randomly sampled participants within the scope of study during the study process in health and physical education class.

The significant difference between the pre-test and the post-test scores was also well noted in their individually computed, analysed and compared frequencies and percentages evidenced in table one, table three and table five respectively.

However, in a similar research, *Zhang, D. et al., (2007)* reported that, muscle atrophy can and will be opposed by the signaling pathways, which induce muscle hypertrophy, and/or an increase in muscle size. According to *Zhang, D. et al., (2007)*, one way in which exercise induces an increase in muscle mass is to down regulate the pathways which have the opposite effect.

One important rehabilitation tool for muscle atrophy as stated by *Zhang, D. et al., (2007)*, include the use of functional electrical stimulation to stimulate the muscles, which has seen a large amount of success in the rehabilitation of paraplegic patients. *Zhang, D. et al., (2007)* continues that, since the absence of muscle-building amino acids can contribute to muscle wasting (that which is torn down must be rebuilt with like material), amino acid therapy may be very much helpful and instrumental for regenerating the damaged or atrophied muscle tissue(s), of which the branched-chain amino acids are critical to this process in addition to lysine and other amino acids. *Zhang, D. et al., (2007),* concluded that, in severe cases

of muscular atrophy, the use of an anabolic steroid such as methandrostenolone is administered to patients as a potential cure.

Conclusion:
Based on the results of the finding, it is concluded that, there was a significant difference in comparison between the pre-test and the post-test scores for all the tested variables regarding adolescents' health literacy level as referenced in their respective frequencies, percentages, mean scores, 95% confidence interval difference scores and calculated One-sample t-test scores**.**

Recommendation:
Inactivity and starvation in mammals lead to atrophy of skeletal muscles, accompanied by a smaller number and size of the muscle cells as well as lower protein content, *Fuster, G., et al. (2007).* In humans, prolonged periods of immobilization, as in the case of bed rest is known to result in muscle weakening and atrophy, *Lohuis, T. D., et al. (2007).* It is therefore, strongly recommended based on the outcome of the findings that, nutrition and physical activity (PA) education and training is learned in schools with special reference to high schools by way of improving and impacting on the health literacy of pupils.

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