

MUSCULAR STRENGTH AS A MEASURE OF PHYSICAL FITNESS LEVEL OF NIGERIAN PARA-MILITARY PERSONNEL

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Abstract

The study was on the muscular strength as a measure of physical fitness of Nigerian Para-military personnel. The motivation for the research was kindled by the observed variations in the results of physically demanding tasks carried out by personnel of the selected Para-military Services in joint security operations. The study was to assess the physical fitness of Nigerian Para-military personnel towards ensuring the proper assignment of physically demanding tasks to the Para-military personnel during joint security operations in order to enhance operational efficiency. The research methodology applied in the study was basically descriptive. Data were collected using field method and document analysis. In achieving the purpose of the study, 35 male and 20 female of Nigeria Civil Defence personnel, 30 male and 13 female Nigeria Road Safety personnel and 25 male and 10 female Nigerian Immigration personnel were randomly selected to serve as participants in this study. The sit-up test for muscular endurance was conducted on the participants. The data thus collected were statistically analyzed. The findings of this study revealed that the Nigeria Civil Defence personnel also had significantly greater muscular strength and muscular endurance. The performances of the participants in the tests were measured against the physical fitness standards established for the Nigerian Para-military personnel. On the basis of the findings of this study, it was recommended that during joint security operations, the highest volume of physically demanding tasks should be assigned to the Nigerian Civil Defence personnel, followed by the Nigerian Road Safety and then the Nigerian Immigration. In addition, it was recommended that the three selected Para-military personnel should strengthen the physical training programmes of their female personnel.

Keywords: *Muscular strength, Measure, Physical fitness, Nigerian Para-military and Personnel*

Introduction

The relevance and beneficial of physical fitness during exercise is not only for sports athletes alone but also physical exercise is beneficial to for security personnel's to be fit as well as pregnant women (ACOG, 2015; Bo *et al.*, 2015) have been reported by several authors. Being holistically physically fit means much more than just being able to run a mile or ride your bike for 30 minutes. Complete physical fitness means more than going to the gym and lifting weights three times a week. In fact, physical fitness actually encompasses five essential components such as *Body composition, Muscular strength and endurance Flexibility, Muscular Strength and cardio respiratory*. Physical Fitness is to the human body what fine-tuning is to an engine. It enables us to perform up to our potential. Fitness can be described as a condition that helps us look, feel and do our best. More specifically, it is "the ability to perform daily tasks vigorously and alertly, with energy left over for enjoying leisure-time activities and meeting emergency demands. It is the ability to endure, to bear up, to withstand stress, to carry on in circumstances where an unfit person could not continue, and is a major basis for good health and well-being (United States President's Council on Physical Fitness and Sports, 2005).

Muscular strength is an important component of physical fitness, not only for sports activities but also for daily activities and maintaining physical fitness (Silva *et al.*, 2003). In particular, the relative muscular strength of the upper limbs is fundamental for the development of several activities inherent to para-military training and operations (Silva *et al.*, 2003). Muscular strength refers to the capacity of a muscle to develop activity tension, irrespective of the specific conditions under which tension is measured (Simonen *et al.*, 2003). Strength is the ability of the body to apply force, it refers to the amount of force a muscle or group of muscles can exert. Nelson and Jensen, (1972) defined strength as “the ability of a body or a segment of it to apply force, one effort that can be exerted against a resistance while Johnson and Nelson (1979) defined strength as the muscular force exerted against moveable and immovable objects. Muscular strength can quickly be built up through static (isometric) exercises, and through dynamic (isotonic) exercises. The static exercises are carried out by exercising against an unyielding resistance. Static strength training is the preferred method of the so-called body builders; it can be measured by different kinds of dynamometers, while the dynamic strength exercises are carried out against a moveable resistance. Dynamic strength training is much more advantageous in physical conditioning (Jensen and Fisher, 1979). Vigorous activities depend on the application of great force. Increased strength often contributes to better performance. In certain cases, improved strength can be the most important single contributor to better performance (Nelson and Jensen, 1972).

Strength building stimuli may be provided by:

- Application of muscle tension against a fixed object or another body part
- Specific exercises against body weight as in pull-ups or dips. (Additional weight may be added to the body weight).
- Exercises against external moveable resistance, such as weight training equipment and wall pulleys.
- Hired manual labour or vigorous athletic performance

This is the “power” that helps you to lift and carry heavy objects. Without muscular strength, your body would be weak and unable to keep up with the demands placed upon it. The way to increase strength is to train with heavy weights, working in the 4 – 6 or 12 – 15 rep ranges. The heavier the weight, the fewer reps you should perform!

Furthermore, muscle strength can be defined as the maximum amount of force that a muscle or muscle group can generate in a specific pattern of movement performed at a given velocity (Fleck and Kraemer, 1999), or as the ability of the neuromuscular system to produce tension (Badillo *et al.*, 2001). The ability to support and lift the body weight with the upper limbs gives the Para-military a confidence they need in different situations, whether in actual combat activity or simulation, which reduces the likelihood of exposing their physical integrity to risks concerning Para-military activities (Silva *et al.*, 2003). Strength can be easily assessed by the one repetition maximum test (1-RM). The basic muscle group to be tested is selected and the individual is given a series of trials to determine the greatest weights that the individual can lift comfortably, then keep adding weight until he can lift the weight correctly just one time. If he can lift this weight more than once, more weight should be added until a true 1-RM is reached. Additional strength tests are available using dynamometers, cable tensionmeters and elaborate force transducers and recorders. These tests, however, require expensive equipment and do not cause any substantial improvement in measurement accuracy (Wilmore, 1977).

Hockey (1977) stated that grip strength is the most commonly used measurement of muscular strength. This involves the subject squeezing the hand dynamometer and exerting a maximal force as the musculature contracts forcefully. The force exerted is recorded on the dial. Reliability coefficients had been reported in the 0.90s (Johnson and Nelson, 1979; Tinkle and Montoye, 1961). According to Skinner *et al.* (1990) regardless of how strength is assessed, several factors are important; both isometric and isotonic strength increase from 10 and 14 years to 20 to 29 years, remain unchanged until 40 and 49 years, and then decline. They further stated that lower strength in children is explained more by smaller muscle fibres. Reduced strength in old age is due to muscle atrophy (especially fast twitch), reduced number of muscle fibres and decreased ability to recruit fast twitch fibres. Although strength training in older men had increased their fibre size similar to that of younger men, strength was still less suggesting that some loss with age is neurological. At least a minimum of two 20-minute sessions per week that include exercises for all the major muscle groups are necessary to improve strength. Lifting weights is the most effective way to increase strength.

Fleishman (1964) defined dynamic strength as the ability to exert muscular force repeatedly or continuously during a period of time. He maintained that strength is made up of three main factors, which he called static strength, explosive strength and dynamic strength. Muscular endurance on the other hand is primarily dependent upon the various aspects of cardiac efficiency which in turn exerts influence on the performance of the other parts of the human organism. Muscular endurance is determined by the quality of the muscles, the extensions of their capillary beds and the nerve mechanism supplying them (Fox *et al.*, 1993; Philip & Hornak, 1979). Isokinetic dynamometer is

used to obtain strength curve that is the maximal force of contraction possible at each point in the full range of motion. It has been observed that muscle increases in strength if called upon to increase its work load by what is ordinarily required of it. The amount of strength the muscle can exert determines the amount of physical task which it can accomplish (Verducci, 1980) also emphasized that strength can be increased through using the principle of overload. People need strength to perform their usual daily routines. The amount needed will differ from person to person depending on the type of activity each is engaged in. Strength-training programme must be specifically related to an individual's overall exercise objectives. Our bodies respond very specifically to exercise. Only the muscles fibers that are activated during a training session can increase in strength (Jackson *et al.*, 1999). Strength of a scholar, for example, is different from that of a farmer, both, however, should have sufficient strength to carry them through their daily routine with minimum fatigue.

Muscular strength evaluation has generated a lot of interest because of its relationship to general fitness. It was, for example, the evaluation of the strength of U.S.A. children against their European counterparts that prompted the establishment of the President's Council on Physical Fitness and Sports (Dinubile, 1993). Tests have been designed to evaluate strength and endurance of different muscle groups, such as sit-ups, pull-ups, standing broad jump. Some of the strength tests have had to be modified to improve validity of testing among children. In this study, the one minute bent knee sit-up will be used for females and the two minute straight leg sit-up will be used for males.

The purpose of Para-military physical fitness standards is to keep the security personnel who will be able to meeting up with security standards. In turn, Para-military muscular strength and body composition standards are set according to the requirements of the Para-military trainer, with general standards relevant to every individual regardless of their job assignment. These requirements include physical performance and chronic health risk outcomes.

Statement of the Problem

Para-military fitness consists not only on their mental and psychological fitness alone, rather their physique fitness is of paramount important to enable them keep physical fitness. The muscular strength provide support and lift the body weight with the upper limbs gives to the paramilitary, military and any other security agencies a confidence they need in different situations, whether in actual combat activity or simulation, which reduces the likelihood of exposing their physical integrity to risks concerning Para-military activities (Silva *et al.*, 2003). Physical fitness promotes a standardized physical readiness that is commensurate to one's life style. Security Personnel, irrespective of their occupational specialty, unit, age or gender are expected to acquire a high level of physical fitness. Generally, physical fitness has been used to alter basic health indicators and performance of fitness tasks. However, the benefits of physical fitness can be appreciated only when acceptable objective criteria are developed. This general requirement is based on standards, which can be used to motivate service members towards good fitness habits, regular participation in physical fitness and a healthy general lifestyle. Security personnel fitness enables them to be combat fit ready, hence, the physical training officer's sets the standard for the personnel's and provide scientific data on physical training program of the officers. This study was therefore conducted on muscular strength of the security personnel of the Nigerian Para-military to test their muscular strength fitness level (United States President's Council on Physical Fitness and Sports, 2005).

Purpose of the Study

This study was conducted to explore the muscular strength physical fitness levels of selected Nigerian Para-military (Civil defence, Road Safety and Immigration) respectively. As a tool used globally to assess the fitness of both private and public security personnel's or officers, the results will revealed the nature of their muscular strength fitness levels both mentally and psychologically.

Hypothesis

There are no significant differences among the Nigerian Para-military personnel's in their muscular strength

Methodology

This study was performed based on the field research method suggested by Thomas and Nelson, (1996), using the Sit-Ups testing procedure to test for the Muscular Strength of the selected Nigerian Para-military personnel's which include; Nigerian Civil Defence, Road Safety and Immigration respectively. The total population sample used in this study was 1330. The samples consisted of all sports men and women of Nigerian Civil Defence, Road Safety and Immigration respectively. Stratified random sampling technique was used for selecting the sample in this study. This technique, stratified the identified tri-service population into male and female groups. The sample was selected using simple random sampling technique, in which ten percent of the total number of male and female subjects from each

of the three selected Para-military personnel, there were picked blindfolded, as suggested by Thomas and Nelson (1996). Thus, 35 male/20 female Civil Defence personnel, 30 male/13 female road safety personnel and 25 male/ 10 female Immigration personnel were selected. The sample therefore comprised of 900 male and 430 female para-military personnel, which gave a total sample of 1,330. The researcher grouped the Civil Defence sample into male and female. 350 piece of paper were prepared, out of which 35 were numbered and the rest pieces of paper were left blank. Another 200 pieces of paper were prepared for the female sample out of which 20 were numbered and the rest pieces of paper were left blank. The Civil Defence personnel that picked numbers 1-35 from the male group and 1 to 20 from female group were selected as the subjects for the study. In the case of the Road Safety, they were also grouped into male and female. 300 pieces of paper were prepared for the male group, out of which 1-30 were numbered and the rest were left blank. Another 130 pieces of paper were prepared for the females, out of which from 1-13 were numbered and the rest were left blank. The Road safety personnel that picked numbers 1 to 30 from the male group and 1 to 13 from the female group were selected as the subjects for the study. The researcher grouped the Immigration personnel into male and female. 250 pieces of paper were prepared for the male group, out of which, 1-25 were numbered and the rest were left blank. Another 100 pieces of paper were prepared for the females, out of which 1-10 were numbered and the rest were left blank. The Immigration personnel that picked numbers 1 to 25 from the male group and 1 to 10 from the female group were selected as the subjects for the study. The number of subjects selected for each of the armed service was ten percent (10%) of their total population. This 10% of the total population is statistically accepted in sampling technique (Thomas and Nelson, 1996; Kerlinger, 1986).

The data were collected using the following instrument; Stop watch (used for timing), Whistle (used to start and stop the subject at the expiration of the time) and Floor mat. **The Sit-Ups Test** is used to test the subjects' muscular strength and endurance. The equipment used for this test include; mats, whistle and a stop watch. Each subject was allowed a minute trial. The subjects lied on their back with fingers clasped behind the neck and elbows touching the floor with the knee straight, and the toes pointing upwards, while the heel touched the ground. The body was pulled close to the thigh. The ankle was held firm to the ground by an assistant. The subject continued to repeat the exercise for 60 seconds. A good sit-up was scored each time an elbow touched the knee. The scores was the number of correct sit-ups performed within 60 seconds, while each research assistant scored the subject. The data collected were analyzed to test the hypothesis of the study using Descriptive statistics of mean, standard deviation and standard error to determine the average performance of the subjects, T-test for differences between male and female groups and One-way analysis of variance (ANOVA) and Scheffe's post hoc test for differences on the mean scores among the difference Nigerian Para-military Personnel's was used to compare the differences in the muscular strength and endurance of the selected Nigerian Para-military officers. Statistical significance was set at $P < 0.05$ and all analyses were performed using SPSS version 20.

Results

Information regarding the mean age, height and weight of the three selected personnel's and of the male and female subjects of the Nigerian Civil Defence, Road Safety and Nigerian Immigration are presented in table 1

Table 1: Demographic characteristics of some selected Nigerian Para-military.

Mean scores of the groups on the physical fitness variables

Variables	Civil Defence			Road Safety			Immigration		
	Male N=35	Female N=20	Total N=55	Male N=30	Female N=13	Total N=43	Male N=25	Female N=10	Total N=35
Age (Years)	31.34	27.60	29.47	32.40	27.08	29.74	29.84	27.60	28.72
Height (mts)	1.66	1.64	1.65	1.65	1.65	1.65	1.65	1.65	1.65
Weight (kg)	66.29	60.50	63.395	63.27	62.23	62.75	63.40	62.30	62.85

Table 1 shows that the mean age of the Nigerian Civil Defence, Road Safety and Immigration was 29.47, 29.74 and 28.72 respectively. The mean age of the Nigerian Civil Defence male and female subjects was 31.34 and 27.60 respectively. The mean age of Road safety male and female subjects was 32.40 and 27.08 respectively. Whereas the mean age for Nigerian Immigration male and female subjects was 29.84 and 27.60 respectively. On the whole, the Nigerian Road Safety subjects were older than subjects from other two Para-military personnel's, whereas subject

from Nigerian immigration were younger than the subjects from the other two Para-military personnel's. Among the male subjects, Nigerian Immigration subjects were younger than subjects from Nigerian Road Safety were older. Among the female subjects, Nigerian Road Safety subjects were younger than the subjects from other two Para-military personnel's. Table 1 show that the mean height of each of the three Para-military personnel's was 1.65 meters, the male and female subjects of the Nigerian Civil Defence were taller than their counterparts from Nigerian Road Safety and the Nigerian immigration. The Nigerian Civil Defence personnel were heavier than their counterparts from Nigerian Road Safety and the Nigerian Immigration. Among the male subjects, the Para-military personnel were heavier than the subjects from the Nigerian Road Safety and Nigerian Immigration, whereas females from Civil Defence were lighter than the subjects from the other two Para-military personnel's. Information regarding the mean scores of Nigerian Civil Defence, Nigerian Road Safety and Nigerian Immigration personnel in muscular strength is shown in table 2.

Table 2: Mean scores of Civil defence, Road Safety and Immigration Personnel in Physical fitness tests

Variables	Civil Defence			Road Safety			Immigration		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
Muscular Strength	24.71	16.10	20.405	17.17	19.77	18.47	21.64	18.50	20.07

Table 2 above shows that the Nigerian Civil Defence male personnel had better scores in muscular strength and endurance than their counterparts from Road Safety and Immigration. Similarly, Nigerian Immigration personnel male and female had better scores in Muscular strength compared to male and female personnel of Road safety.

Test of Hypothesis

There are no significant differences among the Nigerian Para-military personnel's in their muscular strength. The Hypothesis was tested using one way analysis of variance, the results of which are shown in table 3.

Table 3: One Way analysis of Variance for differences on Muscular Strength among the Nigerian Para-military personnel's

Source	Sum of Squares	Df	Mean of square	F	Sig.
Between Groups	176.504	2	88.252	3.901	.023
Within Groups	2940.654	130	22.620		
Total	3117.158	132			

$F(2, 130) 3.901 > 3.000 P < 0.05$

Table 3 shows significant differences among the three selected Nigerian Para-military personnel's in their muscular strength. The outcome showed that while the p value of 0.023 is below the 0.05 alpha level of significance the computed F value of 3.901 is greater than the 3.000 F critical value at df 2, 130. The Scheffe's post hoc test (table 4) revealed that significant differences were due to higher score of the Nigerian Civil Defence compared to the Nigerian Road safety and of the Nigerian Immigration, and of the Nigerian Road safety compared to the Nigerian Immigration. Therefore the null hypothesis which state that there are no significant differences among the Nigerian Para-military personnel's in their muscular strength is hereby rejected.

Table 4: Result of the Scheffe's post hoc test on the mean scores of Nigerian Para-military Personnel's in muscular strength.

Para-military (i)	Para-military (j)	Mean Difference (i-j)	Standard Error
Civil Defence	Road Safety	3.628*	.992
	Immigration	.839	1.054
Road Safety	Civil Defence	-3.628*	.992
	Immigration	-2.789*	1.110
Immigration	Civil Defence	-.839	1.054
	Road Safety	2.789*	

* The main difference is significant at the .05 level

Discussion

Muscular strength refers to the capacity of a muscle to develop tension, irrespective of the specific condition under which tension is measured (Simonen *et al.*, 2003). Strength is defined as the ability of the body to apply force. It

refers to the amount of force a muscle, or group of muscles can exert. This study revealed that Nigerian Civil Defence personnel was stronger than their counterparts from Nigerian Road Safety, and Immigration, this findings supports the findings of U.S army (United State President's Council on Physical Fitness and Sports, 2005), according to which Civil Defence personnel have greater strength than their counterparts from other Para-military personnel's. This may be attributed to their involvement in activities of greater resistance.

Conclusion

Para-Military physical training in a systematized manner for an improvement in the anthropometric and muscular strength as well as to increase the muscular strength of upper limbs in Nigerian Para-military officers. Further, this study concluded that RI may be an effective tool for assessing relative muscle strength of the Para-military concerned. From the results obtained above, the male personnel of the Nigerian Civil Defence had greater scores in muscular strength and endurance than their counterparts from the Nigerian Road Safety and Nigerian Immigration. However, female personnel of the Nigerian Immigration had better scores than their counterparts from the Nigerian Civil Defence and Road Safety.

Recommendations

1. The findings of the study shows that generally, the muscular strength fitness level of personnel of the Nigerian Road safety was not as good as those of the Nigerian Civil Defence and Nigerian Immigration. There is therefore the need for the Road Safety to strengthen its physical fitness program by increasing its frequency, intensity and duration of exercise to improve muscular strength and endurance, and muscular strength of its personnel.
2. The investigator in the course of this research found that the Nigerian Immigration does not have an established physical fitness norm for its personnel. There is therefore the need for the Nigerian Immigration to develop norms for different components of physical fitness for different age and gender groups.
3. The investigator found that while the Nigerian Civil Defence and Road Safety developed a point system to determine the standards of each component of physical fitness, the Nigerian Immigration had no such developed system. There is therefore the need for the Nigerian Immigration to develop a point system which can be used to determine the standard of each component of their physical fitness.

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