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Clinical and Electrocardiographic Characteristics of Nigerien Traditional Wrestlers: A Study of 77 Cases

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Abstract

High-level sport induces physiological and electrocardiographic changes in athletes' hearts. Sudden cardiac death (SCD) is the leading cause of mortality in young athletes during exercise. There is an international consensus that young athletes should undergo pre-participation cardiovascular screening. The aim of this study was to describe the clinical and electrocardiographic characteristics of Nigerien wrestlers who participated in the 45th edition of the National Saber of Traditional Wrestling "Kokowa Dosso 2024". This descriptive and analytical study included 77 male wrestlers meeting our inclusion criteria. Mean age was 26.7 years (range 19 - 41 years) and mean weight 87.41 kg (range 65 - 115 kg). One case of severe obesity was noted (BMI 37.50 kg/m^2). Mean systolic blood pressure was 129.51 mmHg (range 100 - 163 mmHg) and mean diastolic blood pressure 77.3 mmHg (range 56 - 114 mmHg). Mean height was 177 cm (range 128 - 197 cm). The EKG was normal in 63.63% of cases; sinus bradycardia was present in 36.4%, left ventricular hypertrophy (LVH) in 26.0%, early repolarization in 11.7%, negative T-waves in 10.4%, right ventricular hypertrophy in 1.3%, and first-degree atrioventricular block in 6.5%. Some EkG abnormalities observed in our study are probably due to competitive sports.

Keywords

Traditional Wrestlers, National Saber Kokowa Dosso 2024, Niger, EKG Changes

1. Introduction

Traditional wrestling, the premier sport in Niger, is a factor of national cohesion. Historically practiced at the end of the rainy season with rudimentary rules, this physical and cultural activity was formalised during the national seminar held in Dosso from 10 to 14 August 1989. Initially called the "National Traditional Wrestling Championship", it is now known as the "National Saber of Traditional Wrestling" and is organised on a rotational basis across the country's regions under a regularly updated code.

Traditional wrestling is a combat sport whose objective is to throw the opponent to the ground or to win by decision of the refereeing or medical panel. It involves direct and active use of the arms and legs on the opponent's body in offensive and defensive actions. According to the Mitchell classification based on motor strength and oxygen consumption, wrestling is a Class III B sport (40% - 70% of VO2max and third-degree voluntary motor strength), and is therefore likely to induce physical and electrocardiographic changes.

The particularity of our study lies in its setting during a national event - the National Saber of Traditional Wrestling - and in the inclusion of wrestlers from all regions of Niger. The objective was to describe the clinical and electrocardiographic characteristics of Nigerien wrestlers participating in the 45th edition of the National Saber "Kokowa Dosso 2024".

2. Methods

This descriptive and analytical study evaluated the clinical and electrocardiographic characteristics of Nigerien wrestlers who participated in the 45th National Saber of Traditional Wrestling "Kokowa Dosso 2024", held from 20 to 29 December at the Salma Dan Rani Arena in Dosso.

Each regional league pre-selected its best wrestlers, who trained regularly (≥5 hours/week) and were placed in a training camp for at least two months to prepare physically, technically, and mentally. All participants underwent a pre-competition medical examination to rule out contraindications to sport after signing informed consent. The evaluation included medical history, physical examination, and a 12-lead EKG.

Collected clinical parameters were age, sex, region, personal or family history of hypertension or diabetes, family history of sudden death, chest pain, malaise, syncope or presyncope on exertion. Physical examination included weight, height, BMI, waist circumference, pulse, and blood pressure.

Five regions performed 12-lead EKGs using a single operator per region, following international standards (paper speed 25 mm/s, gain 10 mm/mV). Three regions were excluded because EKGs did not meet international standards. All EKGs were interpreted by regional cardiologists and then by the sports cardiologist of the National Directorate of Sports Medicine of Niger.

Clinical and electrocardiographic variables were analysed according to WHO and ESC recommendations. Obesity was classified by BMI, hypertension defined

as blood pressure >140/90 mmHg after 10 min rest on several measurements, bradycardia as resting heart rate <60 bpm, and tachycardia >100 bpm. LVH was diagnosed using Sokolow-Lyon index ≥35 mm, RVH by R/S ratio >1 in V1. Conduction and repolarization abnormalities were also evaluated. Corrected QT interval was calculated using Bazett's formula (QTc > 0.50 s = prolonged; QTc < 0.30 s = short).

Data were entered and analysed using Microsoft Excel; Student's t-test and chi-square test were used with a significance threshold of $p < 0.05$.

3. Results

Seventy-seven wrestlers from five regions meeting inclusion criteria were studied. Mean age was 26.7 years (range 19 - 41 years); all were male (Table 1).

Mean weight was 87.41 kg (range 65 - 115 kg), mean BMI 27.27 kg/m^2, one a case of grade II obesity was observed with a BMI 37.50 kg/m^2. Mean systolic blood pressure was 129.51 mmHg (range 100 - 163 mmHg) and mean diastolic blood pressure 77.3 mmHg (range 56 - 114 mmHg). Hypertension was present in 6.49% of wrestlers. Mean height was 177 cm (range 128 - 197 cm) (Table 2).

Clinically, no wrestler reported chest pain, exertional malaise, or family history of sudden death.

Electrocardiographic findings (Table 3)

All wrestlers were in regular sinus rhythm. Sinus bradycardia was observed in 28 wrestlers (36.4%) [Image 1]; mean heart rate 62.94 bpm (range 49 - 99 bpm). LVH was present in 20 wrestlers (26.0%) [Image 2]. Early repolarization syndrome was noted in 9 cases (11.7%) in lateral and inferior leads [Image 3]. Repolarization abnormalities (negative T-waves in precordial, inferior, or lateral leads) were found in 8 wrestlers (10.4%) [Image 4]. Right ventricular hypertrophy was rare (1 case, 1.3%). ST-segment elevation <1 mm in V2-V3 was observed in one wrestler. Right bundle branch block was present in 3 cases [Image 5]; and first-degree AV block in 5 cases. The EKG was essentially normal in 72.7% of cases. Left axis deviation was noted in 5 cases and right axis deviate in one case. However, it should be noted that the same wrestler may present several EkG abnormalities.

Table 1. Distribution of wrestlers by age.

Parameter	Value
Minimum Age	19 years
Maximum Age	41 years
Mean	26.7 years
Median	26 years
Mode	24 years (12 occurrences)
Standard Deviation	±4.7 years

Table 2. Anthropometric parameters.

Variable	Mean	Standard Deviation	Minimum	Median	Maximum
Weight (kg)	87.41	10.97	65.0	88.0	115.0
Height (m)	1.77	0.11	1.28	1.78	1.97
BMI (kg/m^2)	27.27	4.53	1.78	27.46	37.50
Waist Circumference (cm)	88.38	8.62	67.0	88.0	108.0
Pulse (bpm)	70.63	8.70	54.0	70.0	96.0
Systolic Blood Pressure (SBP, mmHg)	129.51	13.90	100.0	130.0	163.0
Diastolic Blood Pressure (DBP, mmHg)	77.34	12.99	56.0	76.5	114.0

Table 3. Electrocardiographic data.

Variable	Count	Percentage (%)
Sinus Rhythm	77	100.0
Normal EKG	56	63.63
Left Axis Deviation	5	6.5
Right Axis Deviation	1	1.3
Ventricular Extrasystoles (VES)	0	0.0
Normal Heart Rate	49	63.6
Bradycardia	28	36.4
Tachycardia	0	0.0
Left Ventricular Hypertrophy (LVH)	20	26.0
Right Ventricular Hypertrophy (RVH)	1	1.3
First-Degree Atrioventricular Block (AVB1)	5	6.5
Left Bundle Branch Block (LBBB)	0	0.0
Right Bundle Branch Block (RBBB)	3	3.9
Pre-excitation	0	0.0
ST-Segment Elevation	1	1.3
Negative T-Wave	8	10.4
Brugada Pattern	0	0.0
Early Repolarization	9	11.7

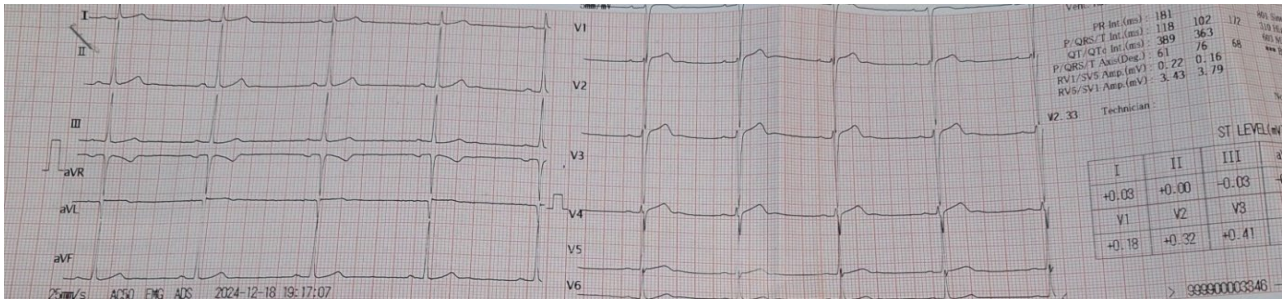

Image 1. Sinus bradycardia at 49 beats per minute.

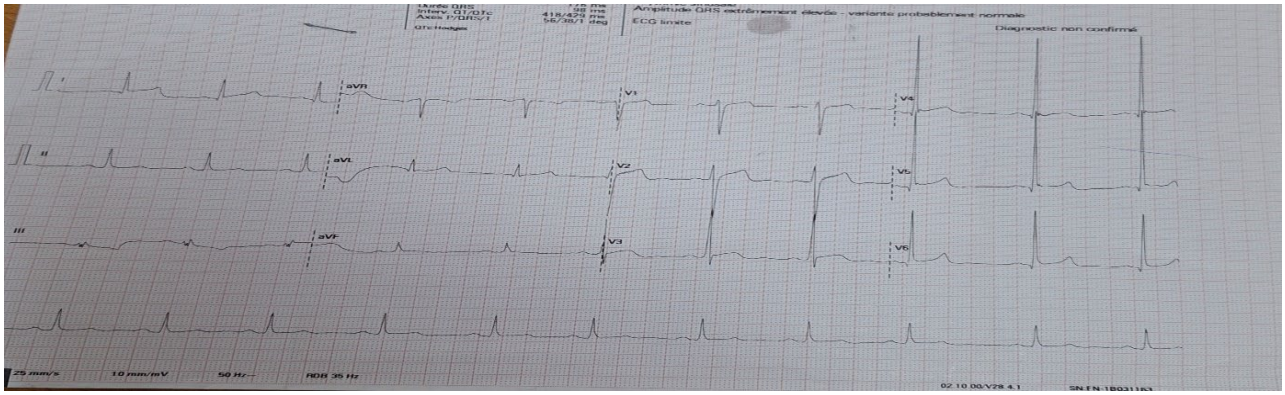

Image 2. Left ventricular hypertrophy.

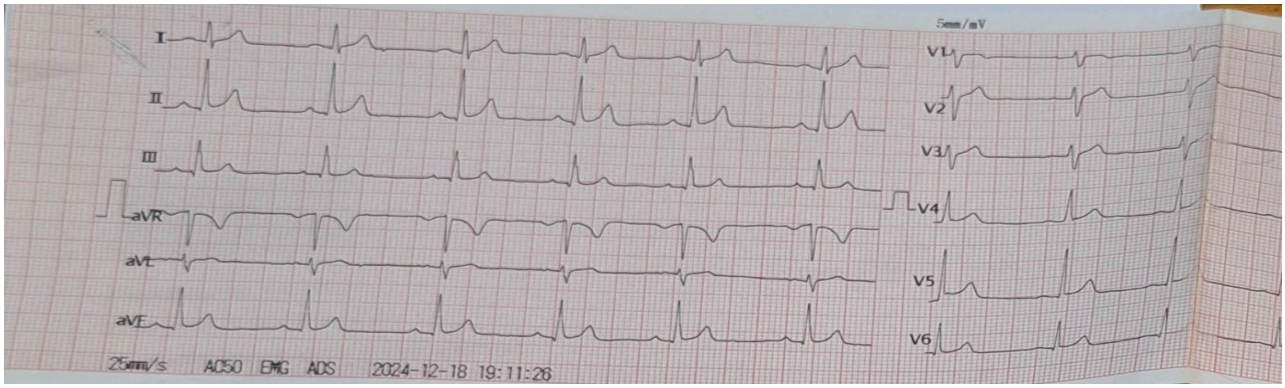

Image 3. Early repolarization syndrome in inferolateral leads.

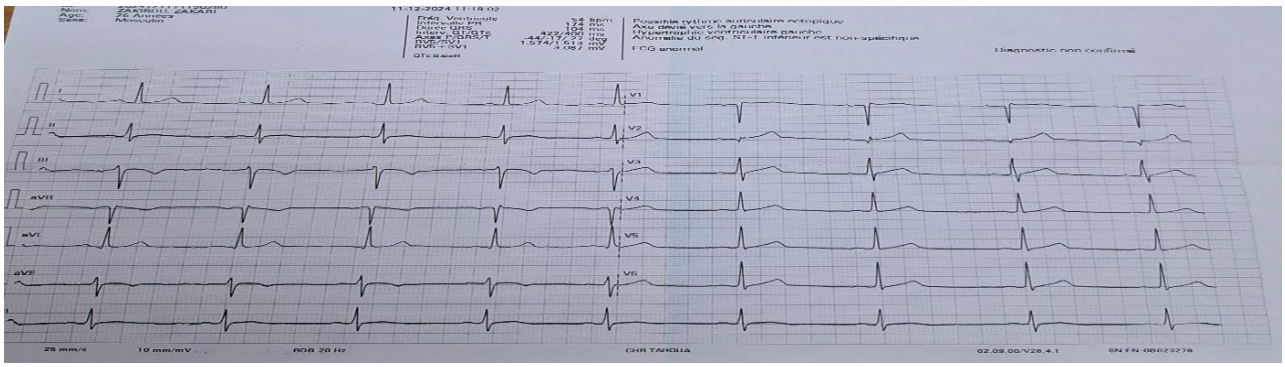

Image 4. Negative T-wave in inferior leads.

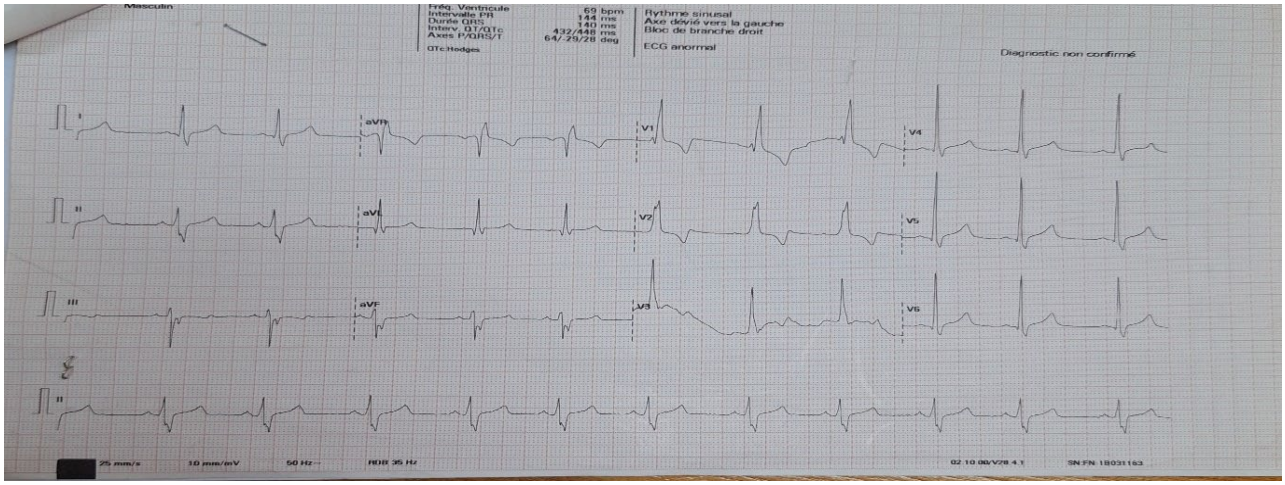

Image 5. Right bundle branch block.

4. Discussion

The main causes of non-traumatic sudden death in athletes are cardiovascular; therefore, rigorous clinical examination and systematic EKG are essential. The ESC and French Society of Cardiology recommend cardiovascular evaluation with systematic EKG before issuing a certificate of fitness for competitive sport [1]. Intensive regular training (>4 h/week of intense exercise) induces electrical cardiac remodelling that is not always consistent. Knowledge of these physiological changes prevents unnecessary additional testing [2]. In Niger, this was the first time systematic pre-competition medical evaluation with EKG was performed during the National Saber.

The 36th Bethesda Conference classified sports according to static and dynamic components [3]. Wrestling, a mixed sport, produces both static and dynamic adaptations. Dynamic effort increases cardiac output, whereas resistance effort predominantly raises blood pressure, causing pressure overload. We found hypertension in 6.49% of wrestlers.

Sinus rhythm predominates in athletes, although wandering pacemaker is occasionally seen [4] [5]; all our wrestlers were in sinus rhythm. Bradycardia is common but usually moderate. A heart rate <60 bpm is reported in 50% - 85% of athletes, <50 bpm in 8% - 10%, and <40 bpm in only 2% - 3% [6]. Sinus bradycardia was observed in 36.4% of our series, possibly because our athletes are not professionals. LVH (26.0%) is explained by the resistance component of wrestling, which increases intracardiac pressures, leading to hypertension and LVH. Prevalence of LVH was lower than the 44% reported by Tougouma in Burkina Faso [6] but comparable to 25.8% and 26.8% reported by Siransy *et al.* [5] and Wilson *et al.* [7].

Mean systolic blood pressure was 129.51 mmHg (range 100 - 163 mmHg) and diastolic 77.34 mmHg (range 56 - 114 mmHg). These findings highlight the need for systematic pre-participation medical screening in all Nigerien athletes to prevent severe complications in undiagnosed hypertensive individuals.

Negative T-waves are considered abnormal if ≥1 mm deep in ≥2 contiguous leads (excluding aVR, D3, V1). In Afro-Caribbean athletes, negative T-waves in V1-V2 are not pathological. We found negative T-waves in 10.4% of cases across various leads (depth 1 mm, asymptomatic). Guidelines state that intense sport does not cause negative T-waves [4] [7] [8]. Exclusively deep (>2 mm) negative T-waves in ≥2 concordant leads (excluding D3, aVR, V1) are always abnormal. Although T-waves in our series were <2 mm, these wrestlers require follow-up and further investigation if symptoms appear. Early repolarization, often related to vagotonia, is frequent in athletes [7,9] and was observed in 11.7% of our wrestlers in anterior (V2-V3) and lateral (V5-V6) leads. First-degree AV block (6.5%) was less frequent than the 10% reported by Letac [10] and 9.7% by Ba *et al.* [11], probably because our wrestlers are seasonal rather than year-round professional athletes. We also observed one case each of right axis deviation, RVH, and ST elevation, and three cases of RBBB (3.9%), all potentially attributable to training.

5. Conclusion

Participation in the National Saber of Traditional Wrestling in Niger requires intensive training that may induce physiological and electrocardiographic changes. Pre-competition medical examination, including systematic EKG, is mandatory for all national-team athletes to prevent sport-related fatal cardiac events.

Study Limitations

The main limitation is the small sample size. A larger multicentre study including several sports disciplines would better characterise these electrocardiographic findings in Nigerien athletes.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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