Theoretical methodological route for the diagnosis of physical development in blind schoolchildren

Abstract

Adapted Physical Education takes into account the Comprehensive Pedagogical Diagnosis as a starting point for the development of the teaching-learning process of schoolchildren with special educational needs. In the adaptations of the Adapted Physical Education program for blind and low vision students, the general objective is declared to contribute to the correct compensation of physical development. In this sense, basic measurements (weight, height, age, sex) and posture are taken into account as the only indicators, so other complementary methods must be included to help clarify the development of the blind student. At this time, posture studies have been carried out using the photogrammetry method but with a clinical approach, which undoubtedly constitute useful experiences, but a procedure for the diagnosis of physical development in blind schoolchildren is not explained. Considering this previous background, the objective was proposed to develop a procedure for the diagnosis of physical development in blind schoolchildren in the context of Adapted Physical Education. Theoretical and empirical methods were used, including analytical-synthetic, inductive-deductive, case study, interview, measurement, document and biomechanical analysis, user criteria, triangulation due to the variation of the method and the case study, as well as statistical-mathematical methods. As a result, a procedure was obtained that was considered viable, useful, and relevant, which is ratified by the users' assessment.

***Keywords**: Adapted Physical Education, diagnosis, blind, physical development, Tiflopedagogy*

Introduction

Diagnosis is the starting point to achieve great goals, it is a challenge for any professional, which is not the exception to that of Physical Culture. Currently, Adapted Physical Education assumes what concerns the Comprehensive Pedagogical Diagnosis (DPI), which facilitates the teaching-learning process in schoolchildren with special educational needs.

For schoolchildren with special educational needs, a psychopedagogical diagnosis is carried out in the Diagnostic and Guidance Centers (CDO), by a multidisciplinary group

made up of a psychologist, pedagogue, psychopedagogue, speech therapist, psychometrician, social worker and does not include the Graduate in Physical Culture. Among the aspects to be evaluated is health but it lacks the physical component, so necessary to develop the pedagogical process of Adapted Physical Education.

The study is carried out on visual impairment, specifically blindness. Cuba assumes the definition of blindness according to the Eleventh Revision of the International Classification of Diseases (ICD11, 2019), which considers that one is blind when visual acuity is less than 3/60 degree and in accordance with the World Health Organization. Health (WHO, 2019) a person is considered blind when visual acuity is 0.05, until there is no perception of light or the reduction of the visual field is less than 10 degrees.

Within the universe of Special Education, there are resources and support, in this last aspect are the educational centers and these include Physical Education as one of the subjects in the curriculum of all schoolchildren at all educational levels. Physical Education as a pedagogical process, encompasses the set of ways of practicing physical exercises for educational purposes, with the purpose of contributing to the physical development of schoolchildren.

Adapted Physical Education develops its teaching process based on the "Adaptations of the Adapted Physical Education program for blind and low-vision schoolchildren." In these adjustments to the program, it is declared as a transversal objective of the first cycle of primary education to contribute to the achievement of compensation and correction of sensory defects and the physical development of schoolchildren.

At present, Adapted Physical Education teachers only take into account, when diagnosing the physical development of blind schoolchildren, the results of the Psychopedagogical Diagnosis issued by the CDO, the results achieved in the Physical Efficiency tests and the postural examination. However, the methodological guidelines do not offer theoretical methodological ways for teachers to carry out a diagnosis aimed at clarifying the degree of growth and development of schoolchildren in order to achieve a more inclusive Physical Education.

Considering the aforementioned precedents, the presence of postural alterations in these schoolchildren becomes understandable. Therefore, it would be prudent for the postural examination to be complemented with other methods that provide criteria related to the state of the muscles that participate in maintaining posture, and contribute to their physical development.

Studies on physical development in the context of Adapted Physical Education in school populations with special educational needs are scarce. Authors such as García (2018); Kendall et al., (2019) and Gardner et al., (2020) focused their studies on aspects related to postural alterations in schoolchildren, adolescents, young people, adults, older adults with low vision and congenitally and acquired blindness, using as means goniometry, Kendell method, the use of software for postural evaluation (SAPO), Core Stability system, bibliographic study from electronic databases and photogrammetry from a clinical context.

On the other hand, Victorero, M., Méndez, N. and Pupo, HR (2020) work on a diagnosis of schoolchildren with intellectual disabilities for their integration into physical-recreational activities, framing only this disability and in this area, pointing out that. The child with special educational needs is cared for, not only based on his limitations, but also on the potential he has.

From the above, the objective of this research is to develop a procedure for the diagnosis of physical development in blind schoolchildren in the context of Adapted Physical Education.

Materials and methods

The methodology used is based on the materialist dialectical paradigm and a total approach is assumed, where the procedures of quantitative research were combined with those of qualitative research.

The first population was made up of a total of eight teachers from the Special Schools for visually impaired, deaf and hard of hearing children in the central region, of which six teachers were selected, based on intentional sampling, considering that they are those who work directly with blind schoolchildren, who also serve as receiving users, who issue criteria and evaluations on the degree of satisfaction they experience with the application of the scientific result; the one that contributes to improving the product and evaluating its impact on the contexts.

The second population was three methodologists, two methodologists from the Provincial Directorate of Education and one from the Municipal Directorate of INDER, who in both cases, provide services in the Department of Special Education and attend to Physical Education of all educational subsystems and levels. , and who serve as introductory users, who benefit from the scientific result, issue judgments and evaluations during the process

of preparing the proposal, as well as criteria on the viability of the scientific result for its introduction.

The third population was made up of three institutionalized blind people studying the first cycle of primary education, two of them with severe intellectual disabilities who did not receive the subject of Physical Education and did receive intensive job preparation. From them, a blind schoolboy was selected for the case study of the "Dionisio San Román" Special School, in the province of Cienfuegos, based on the following criteria:

- is the only institutionalized blind student who received the Adapted Physical Education class when applying the instruments in the 2021-2022 school year.
- This student, according to the degree of vision, is totally blind with no visual rest with a history of congenital bilateral glaucoma.
- He is eight years old, so he is going through the first cycle of primary education.
- does not have any other associated disability.
- has preserved intellect similar to schoolchildren of his age.

Among the empirical methods, document analysis was used, which allowed obtaining precise information to face the investigative process, structured observation (postural examination), data collection with the purpose of diagnosing postural alterations taking into account the anterior frontal plane, posterior frontal and sagittal, the semi-structured interview was coded and the Likert scale was used to clarify gaps in the information.

Triangulation by method for assessing the relationship between postural examination and complementary methods (plantogram and photogrammetry) considering postural alterations in blind schoolchildren as the unit of analysis. The measurement (plantogram) was used in the analysis of the tracing of the footprint impression in order to determine the breech alterations in the blind schoolchild.

Biomechanical analysis (photogrammetry) was used for the analysis of the state of muscle tone of muscle groups in the upper and lower extremities that contribute to the maintenance of correct posture. The case study made it possible to establish new relationships and discover new aspects regarding the topic. The statistical-mathematical method was used with the empirical frequency distribution.

The research assumed four stages that ranged from the diagnosis of the current state of the physical development of the blind student, the selection of complementary methods to the postural examination for the diagnosis of physical development, application of the postural examination and complementary methods to a case until the evaluation of the diagnosis by users.

The procedure assumed for the preparation of the Diagnosis of the Physical Development of the blind student is adapted from Jiménez (2016) and includes: case or cases under study, tests to carry out the physical diagnosis of the blind student, indications for carrying out the tests and the organization of the data.

Results and discussion

Regularities obtained in the diagnosis from documentary analysis and coded semi-structured interview

- The psychopedagogical diagnosis carried out by the CDO was considered as a starting point for the diagnosis in the context of Adapted Physical Education, which includes aspects related to motor skills, disability, deficiencies and matters related to health. In this last aspect, it only takes into account body weight, sex, age and height as indicators of physical development.
- Adapted Physical Education teachers in special schools have the “Adjustments to the Physical Education program for blind and low-vision schoolchildren” in force in the III Improvement of the National Education System (2018-2022).
- The methodological guidelines of the “Adaptations of the Physical Education program for blind and low-vision schoolchildren” do not refer to how to proceed with the diagnosis, and what instruments allow obtaining information in order to clarify aspects related to physical development.
- Lack of the elements that determine the diagnosis of the physical development of the blind student, as well as indicators, indices, tests and methods that can be used in it, the only tests being declared are Physical Efficiency and the postural examination.
- Basic Gymnastics and Athletics units are worked with emphasis in order to achieve corrective compensation for blind students.
- The blind schoolboy who participates in the research is contraindicated by the Ministry of Public Health (MINSAP) to work on jumping and throwing in the Athletics teaching unit because he suffers from congenital bilateral glaucoma.
- In the attendance and evaluation records, the results achieved in the Physical Efficiency tests, postural examination and other exercises included by teachers that evaluate motor development (balance exercises, laterality and basic motor skills) and not development are controlled. physique of the blind schoolboy.
-In the teachers' lesson plans, there is no monitoring of the results achieved by the student in the diagnosis of physical development.

- Regarding the diagnosis of physical development in Adapted Physical Education, there is no homogeneity, it is carried out according to the expertise and initiative of each teacher.
- Regarding the conceptualization of diagnosis, teachers are of the criterion that allows them to know the reality of schoolchildren and draw up intervention strategies to achieve change.
- Regarding the methodological guidelines given in the "Adaptations of the Adapted Physical Education program for blind and visually impaired schoolchildren, the teachers allege that the Physical Education (PE) programs approved in the III Improvement of the National Education System, They do not declare work aimed at physical development as one of their objectives, even though they recognize the physical and functional changes that occur in schoolchildren in the first cycle of primary education.
- Teachers believe that the objective of work aimed at physical development must be maintained.
- The teachers allege that in their improvement and methodological preparations they have not received guidance on the ways and steps to carry out the diagnosis of physical development, which is why they allege that improvement in this issue is necessary.
- Regarding the conceptualization related to physical development, they identify it as if it were motor development, and allude to establishing a parallelism between the indicators to take into account to approach its study.

Taking into account the previous results, it has been possible to reveal the tendency towards a theoretical-methodological gap related to the issue of physical development in Adapted Physical Education teachers, which limits the possibilities of working based on the correction and compensation of blind students.

Procedure for preparing the diagnosis of the physical development of the blind student. (Adapted from Jiménez, 2016) this includes:

A- Case(s): the selection of the case or cases under study with their characterization (personal and psycho-pedagogical data from the CDO file.

B- Tests to carry out the diagnosis of physical development: have the guides or protocols to carry out the postural examination, as well as the methodology to carry out the analysis of the Plantogram and Photogrammetry (free access software). In addition to functional tests with curricular adaptations that are not significant for the diagnosis of physical development in blind students.

C- Indications for carrying out the tests.

-The presence of the school's Adapted Physical Education teacher.

-The test to be applied must be valid and reliable and always repeated under the same conditions.

-Wear light clothing during the tests.

-Explain the objective of the test, avoiding words that lack meaning for the student, which contributes to the work of orientation and mobility.

-The researcher must maintain an adequate distance from the student.

-It is advisable to have an assistant to record the results.

D-Data organization: have the comprehensive data organization sheet used in the diagnosis of the physical development of the blind student (this includes personal data, the CDO (disability, health history, associated disability and physical and functional alterations).

In the functional dimension, it includes matters relating to posture (postural examination) and complementary methods (Plantogram and Photogrammetry), as well as the results of adapted functional tests, through which the physical-functional profile can be established. of the blind schoolboy.

Results of the application of the postural examination and complementary methods to the blind student (case)

Deviations from normal posture are usually called postural alterations, which are defined as the loss of the normal relationship between different parts of the human body segments. (Gamboa and Naranjo, 2017)

The postural examination is carried out in two moments. The posterior frontal plane allows us to assess the existence of asymmetries from the observation of the region of the head and trunk in relation to the spinal column. The presence of winged scapulae, a pelvis that tilts backwards, a flexed head and raised shoulders is observed in the school child.

In the sagittal plane, postural alterations are determined based on the increase or decrease in the physiological curvatures of the spine. In the blind schoolchild, the presence of hyperextended knees, flattened buttocks, flattened abdomen and thorax, and forward head and shoulders are noted. The presence of these alterations is an indicator of poor economy and technique in the movements, which is why they are carried out in a forced manner, exerting greater muscle and bone stress, coinciding with Gazzellini et al., (2016), so they must be attended to early to prevent prevent its evolution towards a flat back with a tendency to lordosis.

The analysis of the footprint is carried out, for analysis and as a technique, that of inking, the results obtained are expressed in percentage (%). The measurement was carried out in two moments, before and after, the Adapted Physical Education class.

Before measuring, a five-minute sitting rest was given and, after the class ended, the same rest time was offered. The class lasted 45 minutes. After tracing the footprint impression, the classification was made for the right and left foot. A tendency to cavus feet is observed in the student.

Through Photogrammetry it was possible to verify weakness in the following muscle groups:

•Thoracocervicocephalic, trunk-scapular, scapulohumeral and trunk-humeral muscles (muscles of the head and relationship with the trunk): This group determines in the blind schoolchild the presence of a forward and flexed head (ventral flexion) and a flattened thorax. This group includes the paravertebral musculature which allows the control of cervicocephalic stability. Therefore, the relaxation or loss of tone of the muscles of this group produces the impairment of cephalic control and, together with the loss of vision, brings with it the lack of postural and spatial maintenance of the head and neck. (Kendall et al., 2019)

•Coxofémorotibial and femorotibial muscles (muscles of the lower limbs): weakness in these muscle groups causes the presence of hyperextended knees, flattened buttocks and the presence of cavus feet in blind students. The presence of this alteration in the feet of the student is associated with a stretching of the triceps surae and a shortening of the long extensors of the fingers, also producing an increase in the activity of the flexor muscles of the foot which displaces the calcaneus. forward and together a dorsiflexion of the talus occurs and the plantar aponeurosis contracts.

Blind students from a postural perspective are characterized by the existence of small movements in the head and pelvis, also, greater flexion of the trunk and head and anteversion of the pelvis indicating little economy and technique in the movements, which is why they are performed forced way, exerting greater muscle and bone stress. (Gazzellini et al., 2016)

Results of triangulation by variety of methods between postural examination and complementary methods (plantogram and photogrammetry)

It was carried out to offer more precisely the conclusions of the study and the postural alterations in the blind schoolchild were taken into account as a unit of analysis. Through the postural examination, the presence of postural alterations is observed in the student.

The results indicate a tendency towards muscle weakness, mainly those that have a direct impact on the cupular mechanism (anterior tibials and lateral peroneal muscles), so that the student presents Postural alterations associated with functional scoliosis due to muscle weakness.

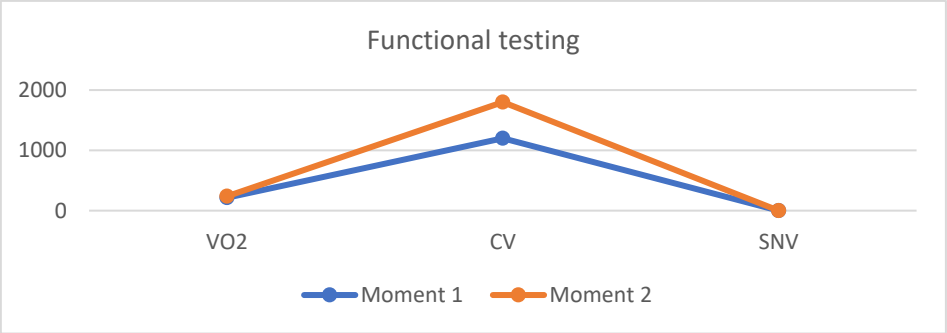

Fig 1. Results of the functional tests carried out by the blind schoolboy.

Symbology: VO2: maximum oxygen consumption; CV: pulmonary vital capacity SNV: vegetative nervous system.

The functional tests were also carried out at two moments. The maximum oxygen consumption (VO2max) allows evaluating the aerobic capacity of the student, and is also related to other central factors such as the activity of the nervous, cardiorespiratory and neuromuscular systems. According to the results obtained in the blind student in the 5-min test, in the first moment (215 ml/kg/min) and second moment (239 ml/kg/min), even when a change is evident, it is evaluated poorly, as it is well below the values established for schoolchildren of the same age.

From the result obtained, it can be inferred that the mechanisms of gas transport and cellular respiration do not occur efficiently, which results in the appearance of fatigue and a decrease in the resistance of the heart of the blind student.

Regarding the expiratory count test, it evaluates pulmonary vital capacity (LVC). From the results achieved, it was possible to verify the trend towards an increase in the values in this indicator (1200 ml to 1800 ml) above the values considered good for their age (1200-1300 ml). The blind student, despite presenting alterations in posture due to visual impairment, is considered that the result obtained despite presenting hypotonicity in the respiratory muscles, could be associated with the efficiency in the lung ventilation process (mechanism of breathing).

Finally, the dynamic ataxia test allows us to assess the interrelationship between the different areas that are located at the level of the cerebral cortex (nervous system with the sensory and somatosensory systems), coinciding with Dorochenko (2018). From the

results achieved by the blind student in the first moment (21 sec.) and the second moment (22 sec.), it was possible to verify that he is evaluated well for his age according to Karpman's criteria (1990).

Therefore, since the visual system is affected, this causes the appearance of alterations associated with the vestibular complex related to the loss of balance and postural stability. The lack of vision modifies the lordosis of the cervical sector and all this translates into a substantial decrease in the movement capabilities of the upper extremities (Borrego et al, 2018). On the other hand, Einstein (2018) suggests that muscle weakness at the pelvic level is the cause of the appearance of the waddle gait.

Therefore, taking into account the previous assumptions and in correspondence with the results achieved, we are in the presence of a schoolchild with apraxia and a tendency to a waddle gait, which could be associated with a marked cerebellar influence and conditioned from the from a neuromuscular point of view due to the muscular hypotonia present in the schoolchild and the involvement of the vestibular group in balance control.

Evaluation of the procedure for the diagnosis of physical development in blind schoolchildren by users (IADOV Technique)

-The nine users, who represent 100%, feel satisfied with the result of the methodological steps, with the tests and complementary methods used for the diagnosis. On the other hand, they declare that the methodological steps are useful and functional for Adapted Physical Education teachers to carry out the diagnosis and they are of the opinion that the proposal constitutes a starting point to carry out the diagnosis of physical development, since until the moment is made from the expertise and creativity of each teacher.

- They consider the proposal for diagnosing physical development to be affordable and viable since it offers the aspects that must be taken into account when working with a file for the organization of the data. The group satisfaction index of users for the diagnostic proposal for physical development in blind students is 0.98, which indicates that teachers are generally satisfied with the proposal.

Conclusions

-The teachers of Adapted Physical Education have theoretical methodological gaps regarding the diagnosis of the physical development of the blind student, they only take into account the results of the Psychopedagogical Diagnosis given by the CDO, the results of the postural examination and the Physical Efficiency tests that They include weight,

age and height as the only physical indicators, which limits the possibilities of promoting changes based on the compensation of the blind student.

- The procedure for diagnosing the physical development of the blind student allowed us to reveal the main weaknesses focused on the presence of postural alterations associated with functional scoliosis, the strengths of the student in not presenting disabilities and associated diseases, which allows the execution of adapted functional tests. , as well as determining the potential associated with the existence of a good vital capacity, which facilitates the work aimed at corrective compensation in the blind student.

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