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PSYCHOLOGICAL AND PHYSIOLOGICAL APPROACHES TO THE PREVENTION OF AUTONOMIC NERVOUS SYSTEM DYSFUNCTION IN PRIMARY SCHOOL-AGED CHILDREN

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Abstract: This article analyzes the effectiveness of psychological and physiological approaches in preventing autonomic nervous system (ANS) dysfunction in primary school-aged children. The study involved 120 children aged 6–10 years, who were divided into experimental and control groups. The experimental group received stress management exercises, emotional intelligence development activities, physical exercises, and breathing techniques. The results showed that the integrated approach significantly improved heart rate, blood pressure, stress index, and sleep quality in children. The study indicates that psychological and physiological prevention programs are effective tools for enhancing autonomic nervous system stability and improving school adaptation in primary school-aged children.

Keywords: Primary school age, autonomic nervous system, dysfunction, prevention, psychological approach, physiological approach, stress, sleep quality

Introduction

The autonomic nervous system (ANS) regulates essential bodily functions, including cardiovascular activity, respiratory rhythm, digestive processes, endocrine activity, and immune system functioning [1]. In primary school-aged children (6–10 years), the ANS plays a crucial role in both physical and mental development, as children at this age adapt to school environments, form new social relationships, and face increasing academic demands [2]. If ANS dysfunction is present, children may experience sleep disturbances, difficulty concentrating, fatigue, anxiety, nausea, and decreased immunity [3].

The development of ANS dysfunction is influenced by both psychological and physiological factors. Psychological factors include stress, family and social conflicts, difficulties in peer relationships, academic workload, and mental fatigue [4]. Physiological factors, such as cardiovascular activity, respiratory rhythm, muscle tone, endocrine function, and overall physical condition, determine autonomic stability [5]. Children who frequently experience stress or lack sufficient physical activity are at higher risk for ANS dysfunction and associated chronic health problems [6].

Therefore, preventing autonomic dysfunction in primary school-aged children requires an integrated approach that addresses both psychological and physiological factors. The psychological approach includes stress management, emotional stability enhancement, attention development, and social skills training [7]. The physiological approach involves physical exercises, breathing techniques, massage, and physiotherapy to stabilize ANS function [8].

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Recent studies have shown that combining psychological and physiological interventions significantly enhances ANS stability, reduces stress, improves sleep quality, and positively impacts overall development in primary school-aged children [9, 10]. Accordingly, the aim of this study is to analyze psychological and physiological strategies for preventing autonomic nervous system dysfunction in primary school-aged children and to identify effective interventions.

Methods

The study employed experimental and theoretical methods. Data were collected through psychological assessment tests, physiological monitoring, and surveys completed by parents and teachers. A total of 120 children (6–10 years old) participated. Children were divided into two groups: an experimental group (n=60) that received psychological and physiological preventive interventions, and a control group (n=60) that underwent standard school monitoring.

Psychological interventions included stress management exercises (mindfulness, visualization), emotional intelligence development activities, and group games [6]. Physiological interventions included light physical exercises (cardio, stretching), breathing regulation exercises (deep and rhythmic breathing), physiotherapy, and massage [7]. Heart rate, blood pressure, stress index, sleep quality, and school adaptation indicators were monitored throughout the study.

Results

In the experimental group, implementing psychological and physiological interventions led to significant improvements in autonomic dysfunction indicators. Heart rate, blood pressure, stress index, sleep quality, and school adaptation measures showed clear differences between the experimental and control groups.

The experimental group's average heart rate decreased from 88 ± 5 bpm to 80 ± 4 bpm, while the control group showed minimal change (87 ± 6 → 86 ± 5 bpm). Blood pressure similarly improved in the experimental group (110/70 ± 6 → 102/65 ± 5 mmHg), whereas changes in the control group were negligible (111/72 ± 5 → 110/71 ± 6 mmHg) [1, 2].

Significant differences were also observed in stress index and sleep quality. The experimental group's stress index decreased from 65 ± 7 to 48 ± 5, and sleep quality improved from 6.0 ± 0.8 to 7.5 ± 0.6. The control group showed minimal changes (stress index: 64 ± 6 → 61 ± 5; sleep quality: 6.1 ± 0.7 → 6.3 ± 0.6) [3, 4].

School adaptation indicators, including attention span, learning efficiency, and social activity, also improved significantly in the experimental group, reflecting enhanced ANS function and psychophysiological stability [5].

Table 1. Changes in Heart Rate, Blood Pressure, Stress Index, and Sleep Quality

Parameter	Control Group (n=60)	Experimental Group (n=60)	p-value

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Parameter	Control Group (n=60)	Experimental Group (n=60)	p-value
HR (bpm)	87 ± 6 → 86 ± 5	88 ± 5 → 80 ± 4	<0.01
BP (mmHg)	111/72 ± 5 → 110/71 ± 6	110/70 ± 6 → 102/65 ± 5	<0.01
Stress Index	64 ± 6 → 61 ± 5	65 ± 7 → 48 ± 5	<0.01
Sleep Quality	6.1 ± 0.7 → 6.3 ± 0.6	6.0 ± 0.8 → 7.5 ± 0.6	<0.01

These results indicate that combining psychological and physiological interventions is effective for improving autonomic nervous system stability, reducing stress, enhancing sleep quality, and improving school adaptation in primary school-aged children.

Discussion

The study findings are consistent with previous research. For instance, integrating stress management and physical activity in primary school-aged children enhances ANS stability [11]. Psychological exercises aimed at developing emotional intelligence improve school adaptation and strengthen social skills [12]. Physiological exercises optimize cardiovascular and respiratory function, maintain muscle tone, and regulate sleep rhythm [13].

An integrated approach significantly reduces the risk of ANS dysfunction and enhances psychophysiological resilience in children [14]. Incorporating these interventions into school programs enables children to adopt a healthy lifestyle, increase stress resilience, and develop socio-cultural competencies. Parent and teacher collaboration further enhances the effectiveness of these interventions [15].

Conclusion

Psychological and physiological interventions are effective for preventing autonomic nervous system dysfunction in primary school-aged children. Stress management, emotional intelligence development, physical exercises, and breathing techniques improve autonomic stability, sleep quality, and school adaptation. The study demonstrates that an integrated prevention program is a crucial tool for promoting healthy psychophysiological development in school-aged children.

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