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CONTENTS

MEDICAL SCIENCES

PEDAGOGICAL SCIENCES

PHILOLOGICAL SCIENCES

ECONOMIC SCIENCES

MEDICAL SCIENCES

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METHODS OF RESTORATION OF PRIMARY MOLARS

Abstract

The authors presented a study that opens new perspectives in the restoration of primary teeth, emphasizing the importance of preserving not only anatomical form, but also the functional role of teeth in occlusion and articulation. The developed restoration method using composite inserts, despite existing limitations, demonstrates perspective in terms of hygiene and preservation of chewing efficiency.

The application of inlays from composite materials for the restoration of primary teeth, accompanied by correction of the occlusal surface for imitation of physiological wear, allows to significantly preserve the volume and topography of the occlusal contacts. This, in turn, contributes to the maintenance of normal functioning of the maxillofacial system during the period of bite formation.

Key words: *occlusion, articulation, scientific research, primary dentition, mixed dentition*

In recent years, many authors have addressed the issue of restoration of primary teeth [1, 2, 4, 5]. However, in most cases, the focus has been on replacing the defect in the hard tissues of the crown of primary teeth without considering the role of these teeth in occlusion and articulation. There is relatively little scientific research on the issues of articulation and occlusion in primary and mixed dentitions [6, 7]. However, a number of authors point out the importance of occlusion and articulation in both primary and mixed dentitions in the formation of a harmonious permanent bite.

During the development of the dento-maxillo-facial system, primary (milk) teeth undergo a series of topographical and morphological changes. The formation of proper dental arches in the upper and lower jaws in the primary dentition is largely influenced by genetic factors, but the type of feeding also plays an important role.

The formed primary dentition is classically characterized as follows: 1) the shape of the dental arches in both the upper and lower jaws is semicircular; 2) there are diastemata and spaces (tremas) between the primary teeth in both the upper and lower jaws; 3) the distal cusp of the second upper primary molar overlaps with the corresponding cusp of the second lower primary molar, creating a "mesial step"; 4) physiological wear of the cusps and incisal edges of the primary teeth in both the upper and lower jaws occurs; 5) the incisal overlap is minimal, or the primary incisors of the upper and lower jaws come into contact with their incisal edges.

Based on the standard physiological primary dentition, the goal of modern restoration of primary teeth is to restore the aesthetic and functional architecture of the hard tissues of the crowns of primary teeth, taking into account the role of the crown elements in occlusion and articulation, as well as their indirect influence on the growth and development processes of the dento-maxillofacial area.

To address this task, we proposed a method for restoring primary molars using indirect restorations. In the current domestic and international dental literature, we have not encountered mentions of the possibility of using composite inlays on primary teeth. This is largely due to time constraints during dental appointments, the often inadequate behavior of children during appointments, and the limitation of using light-cured composite filling materials on primary teeth.

The question also arises regarding the feasibility of using inlays to restore primary teeth. Drawing an analogy with the use of composite inlays on permanent teeth, we applied the Occlusal Surface Destruction Index (OSDI) developed by V.Yu. Milykevich. This index is used to determine the degree of destruction of the occlusal surface of molars in Class I—II defects and to select the prosthetic design. The index is calculated as the ratio of the "cavity—filling" area to the chewing surface of the tooth. The entire area of the occlusal surface of the tooth is taken as 1, and the OSDI is calculated as a percentage of the cavity or filling area relative to the entire occlusal surface.

The author determined that when the OSDI is between 0.55 and 0.6 (i.e., when the surface is destroyed by more than 50%), the use of an inlay is recommended to prevent further destruction. For an index of 0.6 to 0.8, filling and artificial crowns are indicated, while for an index greater than 0.8, the fabrication of pin-retained restorations is recommended. However, the goal of using inlays in the restoration of permanent teeth is to pre-

serve occlusal contact points and the "occlusal compass" as factors for effective load vector distribution and physiological articulation within the articulation paths of group function of the jaw.

The primary and mixed dentitions have a more complex architecture of arches and occlusal surfaces due to the growth of the jaws and the formation of spaces and diastemata, as well as physiological wear of the cusps, which in turn is necessary for changing load vectors that stimulate jaw growth. Therefore, using inlays made of high-strength materials on primary teeth may require placing such patients under regular dental observation, with adjustments to the occlusal surface of the inlay to match the age-related topography of the distribution of wear points/facets on the crowns of primary teeth.

We set the task of studying the processes of physiological wear of the occlusal surfaces of primary teeth crowns, the topographical variability of wear facet distribution, and the occlusal contact points in primary and mixed dentitions. To do this, we selected 150 children aged 3 to 8 years. To study the topographical variability of the distribution of occlusal contact points, the children were divided into four groups: 1) those with a formed primary dentition (3 years ± 6 months); 2) those with a formed primary dentition but with spaces and diastemata between the incisors and canines of the upper and lower jaws (from 4 to 5.5 years); 3) children in the early stage of eruption of the first permanent molar (from 6 to 7 years); 4) children with a mixed dentition during the eruption of the central permanent incisors of the upper and lower jaws (from 7 to 8 years). For all children, an occlusal diagram was taken, and the results were digitized to create a computer statistical model of the distribution of occlusal contact points relative to the occlusal surface area in the primary dentition.

For the study of the topographical variability of the distribution of wear facets on the occlusal surfaces of primary teeth crowns, the children were divided into four age groups: 1) 4 years; 2) 5 years; 3) 6 years; 4) older than 6.5 years, but with unchanged primary central incisors.

The contours of the wear facets were colored, and these contours were transferred to the occlusogram for subsequent digitization, enabling the creation of a computer statistical model of the distribution of wear facet topography relative to the occlusal surface area of the primary dentition. The obtained data were presented in the form of a compiled computer model depicting the distribution of occlusal contact points and wear facets during different periods of physiological changes in the occlusal relationships between the dental arches in the primary dentition as part of the growth and development process (Figures 1-4).

Based on the obtained data, a protocol for the dispensary management of children with restored primary teeth using indirect restorations was developed, considering the necessity of selective adjustment of the restorations to simulate the physiological wear of the occlusal surface of the crowns of primary teeth.

Preparing a primary tooth for restoration using inlays is not different from preparing permanent teeth. When preparing teeth for inlays, the following basic principles are followed: 1) the cavity is given the most rational shape to ensure the smooth insertion and removal of the inlay, i.e., all external walls should slightly diverge, and therefore, the entrance part should be slightly wider; 2) a box-like cavity shape must be created from which the inlay model can only be removed in one direction (the internal walls of the cavity should be parallel to each other and perpendicular to the bottom); 3) to prevent secondary caries, the cavity is prophylactically expanded and a bevel (falz) is created along the enamel margin, grinding it at a 45° angle, approximately 1/3 of the enamel thickness; 4) to prevent displacement or tipping of the inlay due to vertical and transverse forces, additional retention elements are created within healthy hard tissues; 5) when forming cavities in difficult-to-reach interproximal areas, an initial cut is made; after removing the contacting part of the tooth, free access to the carious cavity is opened, facilitating its formation; 6) the cavity should be asymmetrical or have additional indentations, serving as a guide when inserting the inlay; 7) the cavity should be sufficiently deep, extending into the dentin and not shifting under the influence of chewing pressure; 8) cavity preparation for the inlay should conclude with smoothing the edges and walls with carborundum burs and finishers.

To fabricate the inlay, an impression is made using silicone material. A model is cast from supergyp or fast-setting modeling materials. The model is coated with an isolating varnish. The inlay is modeled from light-cured composite filling materials, considering the appropriate age-related architecture of the occlusal and interproximal surfaces of the tooth, and the restoration of the "occlusal compass" of primary teeth. Polymerization of the inlay material is performed, followed by grinding and polishing. The inlay is cemented using glass ionomer cement.

An analysis of 50 indirect restorations of primary teeth and 80 fillings on primary teeth made of glass ionomer cement, conducted to assess the hygiene of inlays and the restoration of chewing efficiency, showed that plaque formation in the area of the inlays was 83% lower than in the area of similarly located glass ionomer cement fillings. According to the analysis of occlusograms, the use of composite material inlays for restoring primary teeth, with gradual correction of the occlusal surface of the restoration to simulate the physiological wear of the cusps, resulted in the preservation of the volume and topography of the occlusal contact points reaching 94% compared to the nominal volume of occlusal contact points on the opposite, intact side of the jaw.

Thus, the use of indirect restorations in primary teeth is feasible when there is a need to restore a large volume of lost hard tissue in the tooth crown, provided that the average topography of occlusal contact points is maintained and the patient is monitored through dispensary observation, with selective adjustment of the restoration to simulate the physiological wear of the cusps of primary teeth.

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MOUTH BREATHING TYPE AND ITS INFLUENCE ON THE DEVELOPMENT OF SAGITTAL MALOCCLUSIONS

Abstract.
Nasal breathing disorders can significantly affect the formation and development of occlusion, especially in children. The habit of mouth breathing, often associated with nasal congestion or other issues, can lead to deformation of the dental arches, changes in jaw position, and consequently to malocclusion.

Keywords: *Nasal breathing disorder, mouth breathing, maxillary constriction, sagittal malocclusions*

Prevalence of Dentofacial Anomalies and Deformities Among the Pediatric Population

According to many authors, the prevalence of dentofacial anomalies and deformities among children remains quite high—ranging from 35% to 75% [1, 2, 3, 4]. Among these, sagittal malocclusions predominate, with prevalence reported between 33% and 67% according to various sources [5].

The formation process of a child's dentofacial apparatus is influenced by a number of factors, both endogenous and exogenous. Endogenous factors include genetic predisposition, intrauterine development disorders, congenital anomalies, diseases in early childhood, and endocrine pathologies. Exogenous factors include improper artificial feeding practices and dysfunctions of the dentofacial apparatus (chewing, swallowing, breathing, speech), harmful habits, injuries, previous inflammatory processes in soft and hard tissues of the area, as well as disrupted timing of tooth eruption and premature tooth loss.

The first to address the problem of upper airway obstruction was Mayer, who in 1869 described patients adapting to mouth breathing, clinically characterized by a more nasal voice, open mouth, and swollen lips [6]. In 1872, Tomes first introduced the term "adenoid face" [7]. Tomes's work was widely supported by orthodontists worldwide, and in 1939, Todd and Broadbent introduced the term "long face syndrome" into orthodontic practice.

In 1907, Angel described airway obstruction as an important factor [8]. The mechanisms of anomalies in children with nasal breathing impairment were studied by M.M. Vankevich (1929), who found that mouth breathing alters the myodynamic balance between antagonist and synergist muscles. With enlargement of the pharyngeal tonsil, children tilt their heads back, especially during speech, thereby displacing the lower jaw backward. Such a position of the mandible over a prolonged period can lead to the development of prognathic (distal) occlusion. When the lingual tonsil is hypertrophied, the airflow passage through the nasal cavity becomes more difficult. To facilitate breathing, during the day the child protrudes the tongue, and during sleep, the mandible assumes a mesial position. As a result of the tongue shifting away from the epiglottis, conditions are created that facilitate the passage of the airflow, gradually leading to the development of a prognathic (mesial) bite. The position of the tongue also changes, and the activity of the masticatory and buccal muscles increases, which results in the formation of incisor open bite [9]. Betelman A.I. (1965) explains the occurrence of sagittal malocclusions by a range of etiological factors, identifying three main groups: genetic, congenital, and acquired. Acquired etiological factors include neuroendocrine system diseases, infectious diseases, childhood illnesses (including rickets), nasopharyngeal pathology, harmful habits, and others [10].

According to Khoroshilkina F.Ya., Demner L.M. (1987), Betelman A.I. (1965), Pogodina A.A. (1955), and Moldoveniaské K. (1990), pathology of the upper respiratory tract contributes to the occurrence and development of anomalies and deformities of the upper and lower jaws. The primary causes provoking nasal breathing disorders and consequently mouth breathing include: nasal septum deviation, hypertrophy of the inferior nasal conchae, increased incidence of adenoid vegetations (48.5% of cases), and palatopharyngeal tonsils (60%), which act as mechanical obstacles to nasal breathing.

Prolonged nasal breathing impairment leads to the harmful habit of mouth breathing, which negatively impacts the development of the entire dentofacial apparatus, resulting in narrowing and elongation of the upper dental arch and deformation of the palate ("high-arched palate" or "gothic palate"). The mechanism of deformation formation is due to the following reasons: with mouth breathing, the mouth is always open, which causes the pressure of the buccal musculature to increase beyond normal, compressing the lateral sections of the upper dental arches.

A constantly open mouth also alters the tongue's position. Normally, with a closed mouth, the tongue

contacts the palatal surfaces of the teeth and compensates for the buccal muscle pressure on the lateral teeth. The mandible is displaced backward due to increased tone of the mentalis, digastric, and mylohyoid muscles. Typically, a combined deformation develops—distal occlusion with deep incisal overlap [4, 11, 12, 13].

Pogodina A.A.'s research (1955), studying the relationship between dentofacial anomalies and chronic nasal and pharyngeal diseases using a modified rhino pneumometer by Lozanov, found such diseases in 34% of children. Among children with normal occlusion, nasal and pharyngeal diseases were found in only 6% of cases.

With nasal breathing, during inhalation, negative pressure is created in the oral cavity, and during exhalation, a uniform positive pressure is maintained. This balanced pressure allows the jaw to develop normally. Mouth breathing disrupts these conditions, resulting in a constricted upper jaw.

The study by A.A. Pogodina showed that there is no consistent and direct correlation between pathological malocclusion and impaired nasal breathing function. The author considers the hypothesis of mechanical impact of the airflow on jaw deformation unproven. According to her, the development of the most severe forms of malocclusion in pathological processes of the nose and pharynx accompanied by nasal breathing impairment can be explained by various systemic pathological changes in the child's body [12].

Chronic inflammatory processes of the oral mucosa were also discussed. The author notes that patients with the typical "adenoid face" exhibit reduced tone of the upper lip, which becomes flaccid and short and cannot fully cover the anterior teeth, causing them to be visible at rest. As a result of the altered position and loss of function of the upper lip, the saliva flow from the minor salivary glands located in the lip decreases, thereby reducing the natural cleansing effect on the teeth. The gums are exposed to opposing influences: moistening from the tongue on one side and dryness from the vestibular (outer) side. This "wet-dry" effect leads to incomplete keratinization of the gums [14].

Ilyina-Markosyan L.V. (1974) established that illnesses in early childhood often lead to the formation of dentofacial anomalies. Among children with rickets, 60% exhibited jaw deformities and malocclusions. The disease is based on impaired phosphorus-calcium metabolism. Under the influence of muscular forces attached to the mandible, deformation of the jaw bones occurs. The lower dental arch acquires a trapezoidal shape due to thickening of the anterior section. The upper dental arch becomes saddle-shaped due to pressure from the buccal musculature on the premolar area of the dental arches. Vertical incisor open bite develops. According to the author's observations, most children with rickets had enlarged tonsils and complicated nasal breathing, which itself can cause malocclusion [15].

To determine the relationship between dentofacial anomalies and impaired nasal breathing, otolaryngologists examined 2,503 children aged 1 to 14 years in childcare facilities in the cities of Ufa and Kazan, including 1,303 girls and 1,200 boys.

Results of the study on the prevalence of dentoalveolar anomalies and their association with nasal and pharyngeal pathology

Dentoalveolar anomalies were identified in 1434 children out of 2503 examined, accounting for 57.3 ± 2.1%. Among them, 169 (11.8 ± 1.8%) had anomalies of individual teeth, 656 (45.8 ± 1.3%) had anomalies of the dental arches, and 609 (42.4 ± 2.7%) had malocclusions.

Examination of ENT organs in the same children revealed nasal and pharyngeal pathology in 743 (29.7 ± 1.9%), including:

- hypertrophy of the palatine tonsils in 461 children,
- chronic rhinitis in 29,
- hypertrophy of the inferior nasal conchae in 7,
- chronic maxillary sinusitis in 13,
- nasal polyps in 4 children.

Based on these data, the prevalence of breathing disorders among children with dentoalveolar anomalies was 48.1 ± 1.9% ($p < 0.001$). The authors concluded a causal relationship between dentoalveolar anomalies and impaired nasal breathing [16].

The views of A.A. Pogodina (1958) on the causal relationship between distal, mesial, and open bites with nasal breathing impairment are confirmed by data from F.F. Mannanova (1981). Among children with ENT pathology and malocclusions, the most frequent types are:

- distal bite – 51.3%,
- open bite – 29.1%,
- mesial bite – 12.4%,
- deep bite – only 8%.

Mannanova conducted treatment on 154 children aged 6 to 13 years with malocclusions and nasal and pharyngeal pathology, and 43 children with malocclusions and healthy nasopharynx. Treatment results showed that impaired nasal breathing complicates orthodontic treatment: children with nasal breathing disorders without prior sanitation of ENT organs adapt poorly to orthodontic appliances and sometimes refuse them, especially with II–III degree adenoid vegetations. Removal of adenoid growths does not always restore nasal breathing, as many children continue mouth breathing.

Therefore, Mannanova and Demner proposed using the method of rhinopneumotachography and found that one month after surgery, 59.1 ± 1.3% and three months after, 39.3 ± 1.6% of children still do not restore nasal breathing independently, even though the surgery was performed 3–4 years ago.

For these children, alongside orthodontic treatment, myogymnastics and breathing exercises were prescribed, and Frankel appliances were used. Children who regularly performed exercises had their appliance treatment duration shortened by 5–6 months. Failure to restore nasal breathing during treatment often led to relapse of malocclusion after orthodontic treatment.

The authors concluded that timely sanitation of ENT organs and therapeutic physical training are necessary to prevent dentoalveolar anomalies in children with nasal breathing disorders [11, 12].

In children with oral breathing, the lower jaw is constantly lowered, the tongue rests on the floor of the mouth, and the condylar process exerts constant pressure on the mandibular fossa, which may stimulate excessive development and growth of the mandible. Additionally, lack of tongue pressure on the palate causes narrowing of the maxilla in sagittal and transverse planes, leading to class III malocclusion with reduced or reversed overlap [17].

Bresolin D. et al. (1983, 1984) demonstrated that patients who breathe through the mouth have longer faces with narrow and retrognathic jaws.

In children, due to impaired nasal breathing, the lower jaw rotates backward and downward, leading to the development of Class II malocclusion and a skeletal Class II profile with increased overjet. The muscles that depress the lower jaw exert reverse pressure on it, causing displacement of the mandible and delayed growth. The buccinator muscle applies constant pressure because the mouth remains open, the tongue does not occupy its physiological position and does not balance this pressure. As a result, narrowing of the upper dental arch occurs, forming a high-arched (gothic) palate. At the same time, lip function is impaired: the lower lip is large and protruding, while the upper lip is short and hypofunctional [10,11].

Vinogradova S.A. et al. (1981, 1987) established a correlation between the type of dentoalveolar deformity and the nature of ENT pathology. The authors found that crossbite and prognathic bite most often occur with nasal septum deviation and chronic rhinitis. Progenic bite is found in cases of chronic rhinitis with tonsillar hypertrophy. Mouth breathing, resulting from inflammatory processes in the nasal cavity, causes a characteristic head posture in children during sleep — a backward tilt. This contributes to the development of prognathic bite. After orthodontic and ENT treatment, the head posture normalizes and breathing function improves.

Mouth breathing caused by airway obstruction, as emphasized by Persin L.S. (1998), leads to changes such as lip incompetence, low tongue posture, increased vertical facial height, and clockwise rotation of the mandible.

In the article by Isabel Chung Leng Mucoz (2016) titled *"Comparison of Cephalometric Values of the Upper and Lower Airway Volume in Children with Nasal and Mouth Breathing in Age Groups from 6 to 12 Years"*, the author demonstrated that children who breathe through the mouth are more likely to have a greater inclination of the mandibular plane (NS-Go Gn), as well as the occlusal plane (NS-O Pl), compared to children who breathe nasally ($P < 0.05$). The group of mouth-breathing children also showed an elevated position of the hyoid bone, and their nasopharyngeal airway space was significantly smaller than that of the nasal-breathing group ($P < 0.001$).

The literature describes many different theories regarding the mechanism of dentofacial deformities formation:

1. Mouth breathing presses the tongue against the palate and deforms the jaws (Blox, 1889; Michel, 1908);
2. Distal bite arises due to tonsillar hypertrophy and complicated nasal breathing when the patient tilts the head forward to facilitate breathing (M.M. Vankevich, 1929);
3. Progenia develops due to constant protrusion of the lower jaw when the lingual tonsil is enlarged to facilitate breathing (Herbst, 1908; Isard, 1930);
4. Open bite occurs with mouth breathing due to the pressure of the tongue on the lower front teeth (Misch, 1922);
5. Equilibrium of the muscles of the maxillofacial region is disturbed with mouth breathing (Angel, Körbitz, 1910; Izard), etc.

All theories converge on the mechanical compression of the maxilla. This is supported by extensive specialized literature indicating significant systemic changes in the body when nasal breathing function is impaired. These changes affect external respiration (A.I. Yunins, 1956), circulation (N.A. Nadjaryan, 1948; D.S. Blyakher, 1968), digestion (V.V. Gromov, 1941), the morphological and biological composition of blood (E.I.D.), brain function (V.A. Chudnosovetov, 1941), the condition of vascular walls (S.F. Gamayunov, 1934), and higher nervous activity (E.S. Viktorova, 1937).

Pathological conditions of the upper respiratory tract have especially harmful effects on the growing child's organism. Now more than ever, with the advent of the most modern technologies and treatment options, the orthodontist must also recognize and address respiratory problems. When obstruction of the upper airways occurs, the body adapts by switching from nasal to mouth breathing, which changes head posture, causes the tongue to take a forward position, and displaces the lower jaw backward.

All of the above indicates that the mechanism of jaw deformation in mouth breathing and dentofacial anomalies remains not fully understood. However, there is no basis to deny the importance of impaired nasal breathing in the etiopathogenesis of dentofacial anomalies. Thus, to date, the cause-and-effect relationships between nasal breathing impairment and dentofacial deformities have not been definitively established. The exact mechanism of malocclusion development in nasal and pharyngeal pathology — what precisely is the primary cause of subsequent morphological changes — remains unclear. One thing is indisputable: there is a close pathogenetic relationship between dentofacial anomalies and nasal breathing impairment. Therefore, a mandatory condition for the successful orthodontic treatment of dentofacial deformities in children is the elimination of pathological processes in the nasal cavity and pharynx.

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CONTINUOUS GLUCOSE MONITORING IN THE INDIVIDUALIZED MANAGEMENT OF DIABETES
(literature review)

Abstract.
Continuous Glucose Monitoring (CGM) has become a cornerstone in the modern management of diabetes mellitus. CGM represents a paradigm shift in the management of diabetes mellitus, offering real-time insights into glucose dynamics that enable individualized therapeutic decisions. This literature review critically examines the clinical utility, technological advancements and limitations of CGM systems in diabetes care as well as synthesizes current global recommendations, including indications, CGM-derived metrics, target ranges, and practical considerations for integrating CGM into individualized diabetes care. The paper highlights key consensus statements from international expert panels and professional societies, offering an evidence-based framework for CGM utilization across various clinical settings. Emphasis is placed on their role in optimizing glycemic control, reducing hypoglycemia, improving quality of life, and enabling precision medicine. Future perspectives focus on the integration of CGM with artificial intelligence, non-invasive biosensing technologies, and personalized digital health ecosystems.

Keywords: *continuous glucose monitoring, diabetes, international guidelines*

Introduction. Diabetes mellitus (DM) is a globally prevalent chronic, progressive metabolic disease that affects millions worldwide and continues to impose a significant burden on global health systems. One of the most critical aspects of effective diabetes management is the accurate monitoring of blood glucose levels. Traditionally, this has been achieved through self-monitoring of blood glucose (SMBG), which involves intermittent capillary blood sampling via finger pricking. While SMBG has played an essential role in diabetes self-management, its snapshot nature fails to provide comprehensive insight into glycemic trends, variability and fluctuations, limits the ability to predict acute glucose excursions.

In recent years, ***Continuous Glucose Monitoring (CGM)*** has revolutionized the approach to glycemic assessment by enabling patients and healthcare providers to track glucose fluctuations in real time. CGM has emerged as a transformative tool, offering comprehensive glycemic profiles, providing a more nuanced dynamic information on glucose concentrations throughout the day and night, allowing patients and clinicians to observe glucose trends, understand the impact of lifestyle factors, and make informed therapeutic adjustments and enabling data-driven, individualized diabetes management strategies tailored to individual needs [5].

Modern CGM devices incorporate electrochemical sensors embedded subcutaneously to measure interstitial glucose levels continuously at frequent intervals (e.g., every 1–5 minutes), offering users and healthcare professionals immediate access to glucose data and alerts for hypo- and hyperglycemia. Improvements in sensor calibration techniques – particularly the shift toward factory-calibrated models – have simplified the user experience and enhanced measurement accuracy, with current devices achieving mean absolute relative differences (MARD) below 10%. Moreover, the integration of CGM systems with mobile applications, insulin pumps, and cloud-based platforms has enabled remote monitoring, trend analysis, facilitated telemedicine services, and supported timely clinical interventions.

A typical modern CGM system comprises several essential integral components that work synergistically to deliver precise and actionable data [7, 11]. The first is the **sensor**, a small, flexible filament inserted subcutaneously, typically in the abdominal area or upper arm. This sensor detects glucose concentrations in the interstitial fluid using an electrochemical reaction, often involving the enzyme glucose oxidase. As glucose reacts with the enzyme, it produces an electrical current proportional to the concentration of glucose present.

The **Transmitter**, attached to the sensor, is a compact module that processes the sensor's signal, converting it into digital data and wirelessly (often via Bluetooth) sends the data to a to a receiving/display device. The transmitter continuously updates the user with current glucose values, generally every five minutes, offering a granular perspective of glycemic status throughout the day and night.

The third component is the **Receiver/Display Device**, which may take the form of a standalone reader, an integrated insulin pump interface, or a mobile application on a smartphone. These platforms display the data through graphs, trends, alerts and historical data, enabling users to recognize trends and take immediate action when glucose values fall outside the desired range. Alerts and alarms for impending hypo- or hyperglycemia when glucose levels reach certain thresholds can be life-saving, particularly for patients with impaired awareness of their glycemic state.

Finally, **data management software** plays a crucial role in long-term care. These software systems collect, analyze, and store historical glucose data, facilitating deeper interpretation by both patients and clinicians. Healthcare professionals can access these insights remotely, often through cloud-based platforms, facilitating the remote patient monitoring, enhancing the capacity for virtual consultations and timely interventions. Moreover, the software supports comprehensive reporting, pattern recognition, and forecasting of potential complications based on glucose behavior.

Together, these components form a cohesive ecosystem that not only delivers real-time data but also supports individualized, informed decision-making. They also lay the groundwork for the integration of advanced technologies such as automated insulin delivery and predictive modeling.

Recommended CGM Metrics and Definitions. Consensus documents emphasize the importance of structured CGM data review using Ambulatory Glucose Profile (AGP) reports. The AGP report is a one page overview, a standardised way of looking at CGM data and interpreting daily glucose and insulin patterns. It is made up of three panels (Fig.):

- **The top panel:** key CGM Metrics and targets
- **The middle panel:** the AGP Profile
- **The bottom panel:** daily views.

This standardised overview captures key CGM data which gives the big picture of diabetes management. It is easy to share and helps facilitate communication and understanding for patients with diabetes, their caregivers, and the diabetes care team.

Key Metrics:

1. **Trend Arrows:** Trend arrows indicate the speed and direction of glucose changes. For example, a single upward arrow might show a slow rise, while double arrows up indicate a rapid rise in glucose. These indicators are crucial for adjusting insulin or food intake before glucose levels become problematic.

2. **Time in Range (TIR):** This advanced metric tracks the percentage of time an individual's glucose levels stay within a target range of 3.9–10.0 mmol/L (equivalent to 70–180 mg/dL). TIR is increasingly recognized as one of the most critical parameters of glucose control because it reflects daily life fluctuations more effectively than traditional metrics like HbA1c [8].

3. **Time Above Range (TAR)** and **Time Below Range (TBR):** These metrics quantify the time spent below and above the desired thresholds, respectively. TBR is particularly relevant in assessing hypoglycemia risk and is divided into two subcategories: <3.9 mmol/L (<70 mg/dL) and <3.0 mmol/L (<54 mg/dL), reflecting mild and clinically significant hypoglycemia. Monitoring these values helps reduce the risk of complications from prolonged hyperglycemia or hypoglycemia.

Glycemic variability, expressed as **the coefficient of variation (CV)**, and the **Glucose Management Indicator (GMI)**, a calculated estimate of HbA1c derived from CGM data, are also important metrics. A CV target of <36% is generally recommended. These values enrich clinical discussions and offer more precise assessments of glucose control and therapeutic responses [2, 5].

The ability to view and interpret these trends can lead to significant improvements in diabetes management. Individuals can make more informed decisions about insulin dosing, food intake, and physical activity based on real-time glucose data, rather than relying on static fingerstick tests that only capture a single moment in time [3]. Furthermore, CGM empowers patients by offering immediate feedback on the effects of food intake, exercise, stress, and medication, thus strengthening self-management skills [7]. Healthcare teams are encouraged to integrate CGM into routine visits, use it to guide shared decision-making, and tailor pharmacologic and behavioral interventions accordingly.

Key recommendations include:

- Minimum 14 days of CGM data with ≥80% data sufficiency,
- Use of standardized glucose metrics and trend arrows for decision-making,
- Regular assessment of TIR alongside HbA1c to evaluate progress,
- Education and coaching to optimize interpretation and response to CGM data.

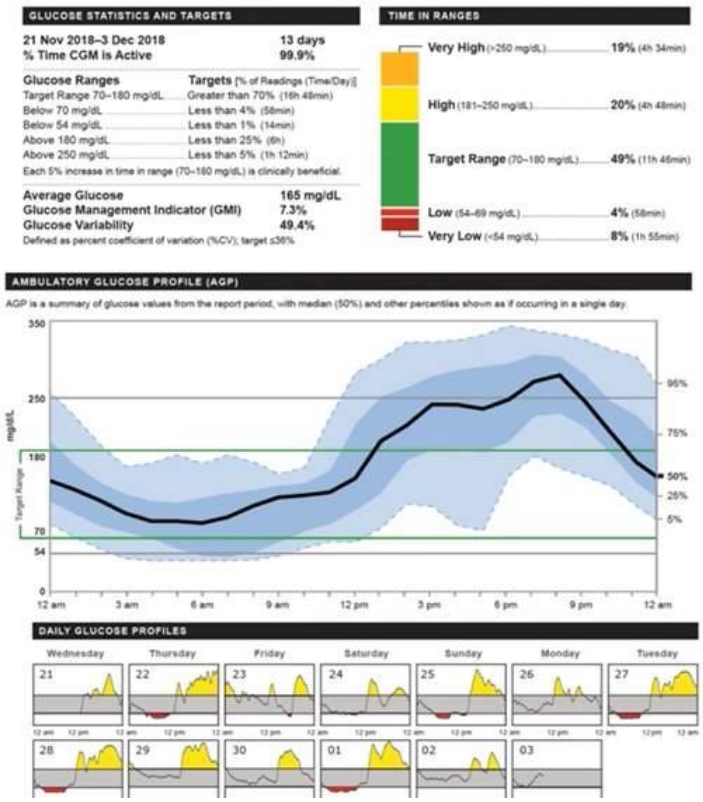

Fig. Ambulatory Glucose Profile (AGP) [3]

Clinical Utility and Benefits.

Recognizing CGM's transformative role, in response to the growing body of evidence supporting CGM's clinical utility, international professional societies and expert groups across the world have established consensus guidelines to standardize its clinical use. These consensus recommendations serve as a valuable reference for clinicians, outlining the appropriate clinical indications, interpretative metrics, target thresholds, and strategies for effective CGM integration [10].

The application of CGM across various patient groups has been studied extensively, with compelling evidence supporting its efficacy in optimizing glycemic outcomes. In individuals with type 1 diabetes, CGM use has consistently been associated with reductions in HbA1c levels, increased time spent in the target glucose range, and a significant decrease in the frequency and severity of hypoglycemic events. These benefits are particularly important in patients with hypoglycemia unawareness or variable insulin requirements [4, 9, 12].

In patients with type 2 diabetes, particularly those on intensive insulin therapy, CGM contributes to improved glycemic control by identifying postprandial excursions and nocturnal hypoglycemia, thereby enabling more accurate dose titration. The American Diabetes Association and European Association for the Study of Diabetes support CGM even among individuals with type 2 diabetes not on insulin, particularly when used intermittently for education and lifestyle optimization, treatment adherence [1, 12].

Professional societies emphasize the benefits of CGM in hypoglycemia unawareness, glycemic variability, nocturnal hypoglycemia, and for patients who struggle to reach glycemic targets.

CGM also plays an important role during pregnancy, where glucose control is crucial for maternal and fetal health. In both gestational and pregestational diabetes, CGM supports tighter glycemic management and reduces the risk of adverse pregnancy outcomes. Pediatric and geriatric populations likewise benefit from CGM's capacity to detect asymptomatic episodes and reduce caregiver burden, promoting safety and quality of life across the lifespan [6].

Consensus Glycemic Targets. To provide actionable clinical goals, international consensus groups have proposed target thresholds for CGM metrics. For most adults with diabetes, the goal is to maintain a TIR of at least 70–180 mg/dL (3.9–10.0 mmol/L) for 70–80% of the day. Time spent below 70 mg/dL (3.9 mmol/L) should be limited to less than 4%, while time under 180 mg/dL (10.0 mmol/L) should ideally remain below 1%. Similarly, time above 180 mg/dL should not exceed 25%, and time above 250 mg/dL (13.9 mmol/L) should be kept under 5%.

Special populations require tailored targets. In older adults or individuals with comorbidities or high risk of severe hypoglycemia, the consensus recommends a slightly more lenient target, with TIR goals set at a minimum of 70% and more conservative limits on TBR. For pregnant individuals with T1D or gestational diabetes, even stricter targets are advised – at least 68% of the time within range, less than 4% below 70 mg/dL (3.9 mmol/L), and no more than 25% above range.

These targets reflect a shift from HbA1c-centric care to a more nuanced, real-time approach to glucose regulation, helping clinicians to personalize treatment plans and support patient self-management.

Limitations and Barriers. Despite the transformative potential of CGM, several barriers hinder its universal adoption. A significant concern remains the physiological delay between interstitial and blood glucose levels, which may affect the accuracy of readings during periods of rapid glucose fluctuation, such as after meals or during physical activity. Although recent innovations have reduced this lag, it remains a clinical consideration in acute decision-making.

The economic burden of CGM also cannot be overlooked. The cost of devices, sensors, and associated technologies poses a challenge, particularly in healthcare systems with limited reimbursement options. This economic barrier contributes to disparities in access, limiting the widespread deployment of CGM in underserved populations.

User adherence represents another challenge. Continuous device wear may lead to skin irritation or sensor dislodgement, which, over time, may result in decreased compliance. Moreover, some users may feel overwhelmed by the constant influx of data, particularly if not adequately trained in interpreting and responding to glucose trends. Addressing these concerns requires robust patient education and ongoing clinical support.

Integration with Personalized Diabetes Management. At the heart of modern diabetes care lies the principle of personalization–crafting management plans that reflect each patient's unique physiological, behavioral, and psychosocial profile. CGM serves as a vital enabler of this approach. By capturing continuous, individualized data, it allows for therapeutic decisions to be made based on real-world glucose patterns rather than isolated measurements.

For insulin-treated patients, CGM data enables fine-tuning of basal and bolus insulin regimens, as well as proactive adjustments in response to specific activities, meals, or stressors. It fosters informed discussions between patients and healthcare providers, enhancing shared decision-making and mutual accountability [12].

Notably, the integration of CGM into hybrid closed-loop systems, also known as artificial pancreas technology, marks a significant advance in personalized diabetes therapy. These systems link CGM devices with insulin pumps and algorithm-driven controllers to automate insulin delivery in real time. Such technologies not only relieve the patient of frequent decision-making but also improve glycemic stability and reduce the risk of both hypo- and hyperglycemia [11].

A key future advancement could be associated with is the integration of *artificial intelligence (AI)*. By harnessing machine learning algorithms, CGM systems may soon be capable of not only reporting current glucose values but also predicting future trends, suggesting lifestyle modifications, and even recommending medication adjustments. The convergence of CGM with wearable fitness trackers, smartwatches, and mobile health applications is expected to enable a comprehensive and interconnected approach to diabetes management.

Conclusion. In conclusion, Continuous Glucose Monitoring has fundamentally changed the landscape of diabetes management. By offering continuous, real-time insights into glucose fluctuations, Continuous Glucose Monitoring empowers patients and clinicians alike to implement more responsive therapeutic strategies, enables a level of precision in glycemic management that was previously unattainable with traditional methods. As healthcare systems move toward more individualized, data-driven care models, the integration of CGM into everyday practice becomes increasingly critical.

As Continuous Glucose Monitoring becomes increasingly integrated into digital and personalized care frameworks, its role as a cornerstone of modern diabetes management is set to expand, demanding policies that make CGM broadly accessible.

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ДОЦІЛЬНІСТЬ ПРИЙОМУ ДОБАВОК ВІТАМІНУ Д ТА А У ПАЦІЄНТІВ З ЗАПАЛЬНИМИ ЗАХВОРЮВАННЯМИ КИШКІВНИКА

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THE FEASIBILITY OF TAKING VITAMIN D AND A IN PATIENTS WITH INFLAMMATORY BOWEL DISEASE

Анотація.
Запальні захворювання кишківника - це група хронічних захворювань, які характеризуються деструктивним неспецифічним імунним запаленням кишківника. У цій статті розглянуто рівні вітамінів А та Д в крові у пацієнтів із запальними захворюваннями кишківника, а саме з хворобою Крона та неспецифічним виразковим колітом. Окрему увагу приділено ролі добавок вітаміну А та Д задля зменшення вираженості запалення та покращення загального стану пацієнтів.

Abstract.
Inflammatory bowel diseases are a group of chronic diseases characterized by destructive nonspecific immune inflammation of the intestine. This article reviews the levels of vitamins A and D in the blood of patients with inflammatory bowel diseases, namely Crohn's disease and ulcerative colitis. Particular attention is paid to the role of vitamin A and D supplements in reducing the severity of inflammation and improving the general condition of patients.

Ключові слова: *запальні захворювання кишківника, хвороба Крона, вітамін А, вітамін Д, дефіцит*
Keywords: *inflammatory bowel disease, Crohn's disease, vitamin A, vitamin D, deficiency*

Relevance: Vitamin D is synthesized under the influence of ultraviolet radiation, and a smaller amount comes from food sources such as fatty fish and dairy products. Vitamin D takes part in the synthesis of cell membrane components, inhibits the maturation of dendritic cells and reduces the production of bishole molecules, which leads to a decrease in the activation of effector T cells. The most studied function of vitamin D is the regulation of calcium metabolism and phosphate. In addition to exposure to bone, vitamin D is also associated with a wide range of biological activity, including the modulation of the intestinal mucosa immunity and the integrity of the intestinal barrier. Vitamin D is a fat -soluble steroid substance that is present in the human body in two main forms: vitamin D2) (cholecalciferol contained in animal sources). Cholesterol is converted to 7-dehydrocholesterol into the plasma membrane of the epidermis cells and subsequently converted to previtamin D, which then turns into vitamin D. Then vitamin is released into blood circulation, binding to the protein that binds vitamin D (VDBP). After endogenous synthesis or absorption in the intestine, vitamin D is transported to the liver, where it turns vitamin D 25-hydroxylase into its main circulating form, 25-hydroxyvitamin D [25 (OH) D]. 25 (OH) D is then converted to its active form, 1.25-dihydroxyvitamin D [1,25 (OH) 2D], with the help of the renal enzyme cytochrome P450, 25-hydroxyvitamin D-1α-hydroxylase (CYP27b1) [1,2].

Because vitamin D has known antitumor and antioxidant properties, a number of studies have also been devoted to the study of its effect on cancer development. It has been established that it plays an important role in the control of the cell cycle, processes of cell proliferation, apoptosis and angiogenesis.

Vitamin A and its active metabolite retinoic acid are involved in a large number of processes in the body. In the context of the immune response, retinoic acid alarm leads to the expression of Foxp3, a transcription factor, which leads to differentiation of T-cells into Treg cells. Treg cells release anti-inflammatory cytokines to reduce the immune response and vice versa,

retinoic acid inhibits the expression of IL-6 receptors. Retinoic acid induces expression α4β7 and CCR9 on T cells. The expression of these molecules leads to the predominant migration of T-cell to the intestinal wall after contact with the antigen. The absorption of vitamin A and its transformation into retinoic acid occurs mainly in the proximal intestine [3,4].

The purpose is to analyze literary sources, research and determine the levels of vitamins A and D in patients with inflammatory bowel disease and the feasibility of using additives A and D in these patients.

Materials and Methods: we have conducted a literature review based on articles published in PubMED databases over the last 10 years. Updated information on the levels of vitamin A and D was analyzed in inflammatory diseases of the intestine and the role of vitamin A and D additives to the course of the disease.

Results and discussion: in the results of the study, the low level of vitamin D in the serum had a inverse dependence on the index of Crohn's disease. It also showed that low levels of vitamin D (<20 ng/ml) was associated with an increased risk of hospitalization and surgery, both in nonspecific ulcerative colitis and in Crohn's disease

Instead of sufficient vitamin D consumption, it is also necessary to have a normal level of calcium to ensure optimal bone health. The greatest source of calcium in food is dairy products and patients with inflammatory diseases of the intestine often avoid them due to the presence of lactose, which can adversely contribute to the course of the disease.

It was also found that when using a gluten -free diet and vitamin D intake, vitamin D is better absorbed. It has been suggested that a gluten -free diet could increase vitamin D levels without additional vitamin D. In the intestine, the active form of vitamin D - calcitriol affects T cells, leading to an increase in the regulation of programmed death receptors and reducing the regulation of the activating CD69 receptor. These properties explain the effects of vitamin D deficiency and the effect on the pathogenesis of inflammatory diseases of the intestine. Vitamin D is partially with food, but most of the vitamin D is synthesized endogenous in the skin. After use, vitamin D should be gradually metabolized in the liver and kidneys in its active form 1α, 25-dihydroxyvitamin D3 [5,6].

The prevalence of vitamin D deficiency in patients with intestinal inflammatory diseases is available in almost 60% of patients. The exact cause of vitamin D deficiency in these diseases has not been fully understood. The most common explanation is that few products naturally contain vitamin D and in combination with impaired absorption of fat -soluble vitamins, its deficiency occurs [7].

Another study revealed that the normalization of vitamin D has significantly reduced the need for hospitalization of patients with intestinal diseases. Also in the study of the author of Lamjadli S and co -authors it was found that low levels of vitamin D in patients with inflammatory diseases of the caecum.

One study found that low vitamin D is associated with increased disease activity, inflammation of the mucous membrane, low quality of life and the possibility of future recurrence. Correction of vitamin D deficiency can bring some improvements to patients with inflammatory bowel disease. But it is difficult to achieve with the help of a diet and sun exposure, so it was necessary to take vitamin D additives. According to the results of clinical trials of vitamin D additives, it was found that they showed a positive effect. Vitamin D in high doses can reduce the expression of proinflammatory cytokines, but it is not determined whether it can reduce the activity of the disease. Intended intake of vitamin D additives in patients receiving infliximab and found that a decrease in the need for high doses of infliximab.

There are no clear recommendations for vitamin D3 for patients with intestinal diseases; There is a study indicating that a daily dose of 4000 IU is adequate to correction of deficiency. One study also found that oral use of vitamin D3 500 IU/day in winter and spring can prevent upper respiratory tract infections in patients with intestinal inflammatory diseases. This may be due to the immunomodulatory effect of vitamin D [8].

Vitamin provitamins and are also widely studied in the context of inflammatory bowel diseases, especially studied β-carotene. When compared to the control group, it was shown that the level of β-carotene in patients with inflammatory bowel disease is significantly reduced.

Since vitamin A and its derivative - retinoic acid have many actions on the body, studies have been conducted on the role in inflammation of the intestine. Vitamin A and retinoic acid affect the integrity of cells, cytokine production, activation of congenital immune cells, presentation of antigens and transportation of lymphocytes to the surfaces of the mucous membranes.

It has also been shown that vitamin A can improve the function of the intestinal barrier and restore damage to the intestinal barrier caused by microorganisms by enhancing the expression of dense contact proteins.

To determine the deficiency of vitamin A use the determination of the concentration of retinol in the serum. However, the concentration of retinol in the serum does not decrease until the reserves of vitamin A in the liver are not approached. Instead, the use of vitamin A supplements did not give comforting results: no benefit from taking 50,000 units twice a day and even from 150,000 units of vitamin A once a day in patients with Crohn's disease.

The effectiveness of vitamin A additives may be potentially limited due to reduced ALDH1A2 expression (family member of Alfeshydrogenase 1 A2), a key enzyme in the synthesis of completely trans-dentinic acid from retinol in dendritic cells or increased activity of the enzyme, which catabolizes atRA, CYP26A1 [9].

Conclusion: therefore, it is found that vitamin D deficiency is observed in patients with intestinal inflammatory diseases and the level of deficiency correlates with the severity of the inflammatory process. Taking vitamin D additives can reduce the inflammatory condition of the intestine by reducing the synthesis of proinflammatory cytokines. Instead, despite the positive effect of vitamin A on the function of the intestine,

it was not revealed that vitamin A administration has a positive effect on the dynamics of intestinal diseases.

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OVERVIEW OF STATIC TRENDS IN THE SPREAD OF HIV INFECTION IN UKRAINE

Abstract.

At the beginning of 2023, 244,000 people living with HIV of all ages lived in Ukraine. The highest HIV prevalence rates were recorded in Odesa (861.8 per 100 thousand people), Dnipro (827.0), Mykolaiv (755.0), Kherson (409.6), Kyiv (385.8), Chernihiv (383.7) regions and in the city of Kyiv (424.6) [1].

The peculiarities of the epidemic process are largely determined by the activity of a particular mechanism of pathogen transmission at a particular stage of the epidemic.

Keywords: *HIV infection, statistics, stages of the epidemic, injecting drug users*

Objective. To analyze the stages of the HIV epidemic in Ukraine since its first detection, as well as the change in the dominant pathways in HIV-infected people.

Materials and methods. Information from the newsletters of the centers for the control and prevention of HIV/AIDS, statistical data on the spread of HIV, a review of recent literature, maps of outpatients in the Chernivtsi Regional Center for the Control and Prevention of HIV.

Results. At the beginning of the epidemic process (1987-1994), there was an increase in new cases of infection (30-40 per year), the incidence rate did not exceed 0.09 per 100 thousand people, with a ratio of men and women of 1:1 [1]. At the second stage of the epidemic (1995-1998), an outbreak of HIV infection was registered among injecting drug users. The incidence rate increased 11 times and reached 17.57 per 100 thousand people, with a significant predominance of men (75%) [2]. The gender specificity of HIV prevalence began to attract attention from the first years of the increase in the level of the corresponding morbidity of the population. Initially, cases of infection were recorded mainly among young men and boys aged 16-25 who injected drugs. Among all registered HIV-infected persons in 1996, the ratio of men to women was 4:1, i.e. the proportion of infected men was 80% (data from the Ukrainian Center for Socially Dangerous Diseases Control of the Ministry of Health of Ukraine). This can be explained by the more risky lifestyle of male representatives, their frequent use of alcohol or drugs, and sexual relations

As a result, the risk of HIV infection for men increased, as did the risk for their sexual partners. Over the following years, the epidemic gradually began to affect the female population, and today in Ukraine the number of men and women living with HIV is almost equal. In 2019, the proportion of men in the structure of new HIV infections was 55.3%, and women - 44.7% [4]. Statistics show that women usually become infected at an earlier age than men. For example, in 2023, 75% of the 15-24 age group in Ukraine were women, 25% were men; in the 25-49 age group, men predominated - 60%, women - 40%; at the age of 50 and older, 56.4% were men, 43.6% were women [5]. Thus, the transition to the third concentrated stage of the epidemic (from 2009 to 2019) was characterized by the widespread involvement of women, adolescents and newborns in the circle of HIV-infected people. This dynamics was associated with a change in the ways of infection, namely, with an increase in sexual transmission (from 32.3% in 2004 to 45% in 2020) and vertical transmission (from 2.2% to 19.2%, respectively). The incidence of HIV infection has increased to 26.22 per 100 thousand people, with a male-to-female ratio of 1.67:1 [6]. At the present stage of the epidemic process (since 2010), there is a radical change in the ways of transmission towards the predominance of sexual transmission (up to 65.7% in 2013), with a ratio of men and women of 1:1. In 6 months

This pathway is still relevant in Dnipropetrovska, Zaporizka, Kyiv, Lviv, Poltava, Kharkiv, Kherson regions and the city of Kyiv [7]. Until now, a significant number of patients are detected late, at the end stage of HIV infection, when they have several opportunistic infections, which significantly worsens their overall prognosis. Patients become infected much earlier than they come to the attention of medical professionals. There are several causal factors to explain this negative phenomenon. For example, only half of HIV-infected people seek medical care and undergo examination. Given the sexual transmission of HIV, which has dominated in the country since 2008 (51.0-65.7%), with a significant prevalence of the disease in socially adapted groups, HIV-infected people have a longer latent period of the disease, which is associated with a gradual increase in viral load. Therefore, the clinical manifestation of the disease, which is the basis for seeking medical care, occurs in the late stages of HIV infection [8]. Only 67% of the identified HIV-positive people are registered at AIDS centers, where they are examined and can receive timely and comprehensive treatment, including ART. One third of the identified HIV-positive patients are not under medical supervision and therefore remain a source of the pathogen for many

years. Among these patients, a significant percentage seek medical care at the III-IV clinical stage of the disease, and the mortality rate reaches 50% [8-9].

It should be noted that in recent years, the conditionally healthy contingent of patients from the "anonymous testing" group has been increasing in Ukraine, among whom the percentage of HIV-positive results remains at 4.8-5.1% (up to 5,000 patients in three years). These figures indicate a large "hidden" percentage of latent clinical forms of HIV infection among the population, and it is these patients who are a very important source of the pathogen that supports the epidemic process in the country [9].

We found that at the time of diagnosis, HIV clinical stage I was diagnosed 7.7 times more often in persons who had been sexually infected, stage II - 4.7 times more often, and stage III - 1.8 times more often than in the group of patients who currently belong to IDUs or who had injected drugs in the past (in all cases, $p<0.001$). On the contrary, clinical stage IV of HIV infection was 1.4 times more common in the group of IDUs than among people who were infected with HIV, probably through sexual contact ($p<0.05$). The proportions of men who contracted HIV presumably through intravenous drug use and sexual contact were approximately the same. At the same time, women were more likely to be infected through sexual contact - (74.0 ± 4.3) vs. (26.0 ± 4.3) % ($p<0.001$). The activation of the sexual route of infection indicates the transition of the epidemic process from injecting drug users (IDUs) to the general population and predicts a deterioration of the HIV epidemic in the coming years. At the current stage, HIV infection is spreading both among PWID and among their sexual partners, i.e., there is a combined effect of parenteral and sexual transmission on the epidemic process [8]. Sexual transmission causes the slower but more widespread spread of HIV infection, so even in the absence of outbreaks among IDUs, the epidemic continues to grow with no signs of stabilization. Today, most new HIV infections occur through sexual contact. Obviously, this is due to social problems and the expansion of sex trafficking amid rising unemployment, especially in rural areas [6]. Throughout the HIV epidemic, as in recent years, 98% of patients with parenteral transmission are injecting drug users. In accordance with the decrease in the number of such persons registered in the region (in 2020 - .42.4, in 2017 -10.8), their percentage among the total number of HIV-infected citizens of Ukraine has also decreased by 1.5 times (from 35.7% to 20.7%) over the past 5 years [7-9]. The current stage of the epidemic process in Ukraine is characterized by changes in the structure of people living with HIV, namely a decrease in the number of IDUs among new cases (from 40% in 2018 to 27% in 2023). Among HIV-infected women, the percentage of IDUs has more than halved (from 23.1% in 2005 to 10.4% in 2023). There is a decrease in the number of patients in the younger age group - 15-24 years (from 12 to 7%), but it is in this most vulnerable group of patients that the highest prevalence of HIV infection remains (0.62%) [1]. These data coincide with our findings and at the same time indicate that intravenous use of PAS is not in itself a risk factor for kidney damage in HIV-infected individuals. At the same time, according to serological monitoring, the percentage of HIV infection detection among sexual partners of HIV-infected persons (14.6%), those who later died (11.5%), prisoners (11.2%), and persons anonymously tested to obtain a certificate of their HIV status (5.1%) remains significantly elevated. These figures are much lower among patients with various diseases who were tested for clinical reasons (3.1%).

Conclusions. The above figures highlight the contingents and risk groups that together account for 51% of patients among whom HIV infection is spreading. And it is among these groups that the most active explanatory work on HIV prevention should be carried out, as well as active monitoring to detect HIV infection in the early stages of the disease should be continued.

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ПОЗАШЛУНКОВІ ПРОЯВИ H.PYLORI-ІНФЕКЦІЇ В ГАСТРОЕНТЕРОЛОГІЧНІЙ ПРАКТИЦІ

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OUT-OF-STOMACH MANIFESTATIONS H.PYLORI-INFECTION IN GASTROENTEROLOGICAL PRACTICE

Анотація.

H.pylori— це грамнегативна спіралеподібна бактерія, яка колонізує слизову оболонку шлунка та дванадцятипалої кишки. Основний механізм передачі — фекально-оральний через що пояснюється велика поширеність контамінації в осередках з низьким рівнем санітарії. Незважаючи на те, що H.pylori відомий насамперед як збудник гастриту, виразкової хвороби шлунка та дванадцятипалої кишки, вже багато років проводяться дослідження, де вивчаються його позашлункові прояви. В цій статті описано роль H.pylori-інфекції у виникненні гастроентерологічних захворювань.

Abstract.

H. pylori is a gram-negative spiral-shaped bacterium that colonizes the mucous membrane of the stomach and duodenum. The main mechanism of transmission is fecal-oral, which accounts for the high prevalence of contamination in areas with poor sanitation. Although H. pylori is primarily known as a causative agent of gastritis, gastric ulcer and duodenal ulcer, studies have been conducted for many years to study its extragastric manifestations. This article describes the role of H. pylori infection in the occurrence of gastroenterological diseases.

Ключові слова: *H.pylori, гастрит, позашлункові прояви, панкреатит, ГЕРХ, холецистит*
Keywords: *H.pylori, gastritis, extragastric manifestations, pancreatitis, GERD, cholecystitis*

Relevance: Helicobacter pylori (H. pylori) is a gram -negative bacterium that is present mainly in the gastrointestinal environment in more than 50% of the world's population. In order to analyze the sources, it is found that in developed countries the prevalence of H. pylori is from 25% to 50%, while in countries. Pylori has special microbiological characteristics that allow it to survive and reproduce in extremely unfavorable conditions, such as the acidic environment of the stomach [1-3].

H.pylori produces urease enzyme in the stomach environment, which helps bufferize acidic pH of the stomach through the production of urea ammonia. H.pylori also has a flagella by which it performs movements, and its spiral form facilitates the penetration into the mucous layer of epithelial cells of the stomach. The main mechanisms of transmission of the pathogen-fecal-oral and oral-oral. This explains the prevalence of infection among members of the same family. Restricting the joint use of utensils, care items, etc. is an important step in the treatment and prevention of H.pylori.

Because of this, more contamination is observed in low -income and sanitation regions. H.pylori, sexually transmitted, is currently investigating. Since people with H. pylori-positive sexual partners have a higher level of infection than control groups/so it is important in increasing socio-economic status and improving living conditions to reduce the prevalence of H. pylori infection [4,5].

The classic manifestation of H.pylori-infection is the development of gastritis of the antral gastric and gastric body. Approximately 10-15% of infected persons develop widespread antral gastritis, in which hypergastrinemia is associated with increased secretion of the stomach with the possible development of duodenal ulcer.

The purpose of our article was to analyze literary sources, research and identify the features of offset manifestations of H. pylori infection in gastroenterological practice.

Materials and Methods: we have conducted a literature review based on articles published in PubMED databases over the last 10 years. Updated information

on the off-site manifestations of H. pylori in gastroenterological practice was analyzed.

Results and discussions: increasingly, the out-of-the-gastric manifestations of H.pylori-infection are increasingly focused. Today, the role of H.pylori in the development or progression of other gastroenterological diseases is increasingly being studied.

The complication of H.pylori on the part of the stomach, in addition to common gastritis is autoimmune gastritis, which occurs through molecular mimicry between the structural proteins of H. pylori and human tissue. The hypothesis of the occurrence of autoimmune reactions during H. pylori infection was put forward after the serum of infected patients revealed antibodies that are reactive to the mucous membrane of the antral stomach. stomach. In the case of antral section, there is a high acidity, which increases the symptoms of GERD. However, lesions of the body of the stomach leads to a decrease in acidity and plays a protective role against this disease [6,7].

The author of the López-Gómez M and the singers investigated the relationship between the adenocarcinoma of the esophagus and H.pylori with infection. It was found that less than 5% of esophageal cancer patients had a positive result on H. pylori, which is about 10 times less than in the general population [8].

H. pylori can also affect the pancreas. 2 pathophysiological mechanisms of development of acute pancreatitis in infection H. pylori have been studied:

1. Hypergastrinemia;

2. Duodenal acidification - together with the translocation of the pathogen into the pancreas.

Studies were conducted where H. pylori was studied in patients with acute pancreatitis. The conclusion was that H. pylori infection is associated with severe acute pancreatitis and should be diagnosed and subsequent treatment with Helicobacter infection in patients with acute pancreatitis.

The role of H. pylori in the development of chronic pancreatitis is also interesting. Patients of contaminated H.pylori have more favorable development of chronic pancreatitis, but H.pylori is not an etiological factor [9].

The relationship between H.pylori and the development of gallstone disease and cholecystitis was also studied. It is found that the presence of H. pylori in bile can be a risk factor for gallstone formation. Concerning chronic cholecystitis, a positive connection with H.pylori was also revealed.

The role of H. pylori in the occurrence of hepatocellular carcinoma (HCC) is also investigated, because when conducting liver biopsy in patients with HCC often reveals H. pylori pathogens in liver biopsy, which also gives impetus to a detailed study of possible communication of cancer and cheelicobacteric infection.

DNA Helicobacter was found in 45% of the liver samples of patients with HCC, unlike 10% of positive samples in the control group. In the study of Rabel-Honçalves Em and co-authors, they also noted the similarity between the three samples of the patient's biopsy of patients with HCC, which were positive in the biopsy of the liver, indicating that the colonization of the stomach with H. pylori strains may be associated with HCC induction.

Pasthanism, by which H. pylori colors a person's liver, has not been fully understood today. It is suggested that the detection of H. pylori DNA in the liver tissue can be the result of moving bacteria from the stomach into the blood through the portal vein, especially in such diseases of the liver as portal hypertension [9].

The most studied effect of H.pylori on such inflammatory diseases of the lower digestive tract as Crohn's disease and nonspecific ulcerative colitis. A negative relationship between H.pylori-infection and Crohn's disease and nonspecific ulcerative colitis was detected. In addition, H. pylori infection not only reduces the risk of inflammatory processes of the colon, but also facilitates the course of the disease.

Conclusion: So H. pylori is a true pandemic of today. In addition to the classic manifestations of H. pylori infection such as gastritis, peptic ulcer of the stomach and duodenum, many of its extra-gastric manifestations have been investigated. Our literature review has found that H. pylori has a positive connection with the emergence of pancreatitis and cholecystitis. Instead, H. pylori contamination in patients with GERD reduces the symptoms of reflux. There is also a negative relationship between inflammatory bowel disease and H. pylori contamination.

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ANALYSIS OF STUDENTS' LEVEL OF AWARENESS ABOUT THEIR OWN HEALTH

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Abstract.

The article presents a comprehensive assessment of individual health parameters of student youth based on the specially developed modernized health questionnaire-36 (MOS-36 – Short-Form Health Survey, or MOS SF-36), which included three main blocks of health components (self-assessment of health status, healthy lifestyle, mental and emotional health). These blocks included the most significant questions. The results of the study showed differences in health status among male and female students by health status, lifestyle (physical activity, quality of nutrition, bad habits, mental and emotional health). $p \leq 0.05$.

In addition, the article determines the level of awareness of students about their own health, as well as identifies the main factors that influence its preservation and improvement.

Keywords: *adapted questionnaire, self-assessment of health status, healthy lifestyle, mental and emotional health, bad habits, risk factors.*

Introduction. Human health potential plays an important role in shaping other "qualitative characteristics" of the population: the level of their education, the ability to master certain professions, career growth opportunities, etc. [3]. Low self-esteem of health affects the formation of risky behavior, the development of harmful habits and psychological disorders.

Health is determined by an integrated assessment of various factors. Approximately 50% of all factors affecting health are objective and are distributed as follows: the environment is approximately 30%, heredity - 18-20%, medical care - 10%. About 50% belong to subjective factors related to lifestyle. These factors include work and rest, physical activity or lack thereof, diet, psycho-emotional state, smoking, alcohol abuse. It is worth noting that reduced quality of life is one of the important predictors of low academic performance of students [2].

Due to constant psycho-emotional stress, excessive physical exertion, chronic somatic and endocrine diseases, digestive disorders, malnutrition and other adverse environmental factors, the number of young people with body weight deficiency is increasing. This necessitates the scientific substantiation of the development of measures to prevent body weight deficiency to preserve health and prevent a decrease in the quality of life of student youth [1].

Presenting the main material.

The subjective component of health allows you to identify certain deviations in self-esteem or minimize the impact of adverse factors on the formation of your own health.

The purpose of the article: using the modernized health questionnaire-36, determine the level of awareness of students about their own health, as well as identify the main factors that influence its preservation and improvement.

Materials and methods: The study was conducted by surveying 207 students (105 male and 102 female students) studying in higher educational institutions of the city of Chernivtsi. The age of the respondents was 20–28 years. The purpose of the survey was to find out the level of awareness of students about their own health, as well as to identify the main factors influencing its preservation and improvement. The sociological survey was based on the specially developed modernized health questionnaire-36 (MOS-36 – Short-Form Health Survey, or MOS SF-36) [1], which included a list of questions that were included in the following blocks: self-assessment of health status, healthy lifestyle, mental and emotional health.

1. Self-assessment of health status included the following questions:
   - assessment of general health;
   - frequency of visits to the doctor;
   - presence of chronic diseases.

2. Block of questions on a healthy lifestyle:
   - frequency of physical activity;
   - sleep duration;
   - food quality;
   - bad habits.

3. Block of questions related to mental and emotional health:
   - frequency of feeling stressed or anxious;
   - knowledge of ways to self-regulate or cope with stress;
   - own satisfaction with the general emotional state recently.

The score assessment of students' health is carried out using 8 scales that reflect the main components of a healthy lifestyle: The maximum number of points on 8 scales is 80 points.

In addition, the study examined and analyzed the responses that were included in the subsections of three blocks of questions. These included the following:
   - food;
   - sleep;
   - physical activity;
   - leisure; daily routine;

- stress control;
- social activity;
- absence of bad habits;
- self-assessment of one's own health;
- respondents' attitude towards their own health;
- presence of diseases;
- seeking medical attention;
- self-assessment of lifestyle;
- respondents' awareness of a healthy lifestyle.

Each respondent's answer was evaluated in points, which were subsequently summed and analyzed. The assessment indicators ranged from 0 to 100, where 100 is complete health. Statistical processing of the material was carried out using the $\chi 2$ method. The difference was considered significant at $p \leq 0.05$.

Since low self-esteem of health affects the formation of health in young people, contributing to the choice of risky behavior, the emergence of harmful habits and the development of psychological problems, it is important to pay attention to the subjective perception of health in adolescents and young people. This allows for timely detection of deviations in the assessment of one's own condition and identification of negative factors, the impact of which can be reduced.

That is why the emphasis on the subjective component of health is necessary. Such an approach helps to timely detect violations and reduce the risk of adverse factors. The generalized results of self-assessment of health are presented in Table 1.

Table №. 1.

Results of self-assessment of the health status of respondents.

Age of respondents		20 - 28 years old			
Gender of respondents		males		famales	
		abs.	%	abs.	%
Self-assessment of health status	Very good	30	28.6	35	34
	Good	45	42.8	50	49
	Satisfactory	25	23.8	14	13.7
	Bad	4	3.8	1	0.98
	Very bad	1	0.95	0	0
Total	45	105	100	102	100

According to the results of a survey of students of 3-6 years (table №.1), the following was obtained: The vast majority of respondents (95%) consider adherence to the principles of a healthy lifestyle to be extremely important. 30 (28.6%) male students and 32 (34%) female students consider their health to be very good; 45 (42.8%) male students and 50 (49%) female students noted that their health is good, 25 men (23.8%) and 14 women (13.7%) considered their health to be satisfactory. 4 male students and 1 female student had poor health. 1 male student, who had a serious chronic disease, had very poor health.

Table №. 2.

Healthy lifestyle of respondents

Age of respondents		20 - 28 years old			
Gender of respondents		males		famales	
		abs.	%	abs.	%
Healthy lifestyle	Low physical activity	22	11.3	34	32.7
	Insufficiency sleep	38	19.6	20	19.2
	Nutritional errors	80	41.2	22	21.2
	Presence of bad habits	54	27.8	24	23.1
Total		194	100	104	100

The results of Table 2 show that female students pay less attention to physical activity than male students. Accordingly, low physical activity was noted in 22 (11.3%) men and 34 women (32.7%). The difference is significant ($P<0.05$). There is also a difference in sleep duration (insufficient sleep among 38 men (19.6%) and 20 women (19.2%). As for the quality of nutrition, as many as 80 male students (41.2%) and only 22 female students (21.2%) assess their diet as irregular and unbalanced, and also often eat fast food or junk food. In addition, more than 2 times more male students (54 people) than female students (24 people) responded that they have bad habits (smoke, drink alcohol, energy drinks or other stimulants). Students do not perceive the threat of undesirable consequences of alcohol consumption as a real threat. Measures to combat harmful risk factors among student youth should be aimed at forming a negative attitude in the younger generation. The main motives for leading a healthy lifestyle, according to students, are good appearance and physical fitness.

Table №.3

Mental and emotional health

Age of respondents		20 -28 years old			
Gender of respondents		males		famales	
		abs.	%	abs.	%
Mental and emotional health	Frequent feelings of stress or anxiety	62	63.3	45	57
	Lack of knowledge about ways to self-regulate or cope with stress	16	16.3	12	15.2
	Dissatisfaction with your overall emotional state	20	20.4	22	27.8
Total	45	98	100	79	100

As a result of a thorough study of the respondents' answers to the more important questions of the questionnaire related to mental and emotional health, we obtained the following: 62 men (63.3%) and 45 women (57%) noted frequent feelings of stress and anxiety, most of which were related to military events in Ukraine. The students' answers indicated that 16 men and 12 women did not have knowledge about ways to self-regulate or overcome stress. 44 people, including 20 men and 22 women (20.4% and 27.8%) expressed dissatisfaction with their general emotional state.

Among the key components of a healthy lifestyle, students emphasized a balanced diet, quality and sufficient sleep, physical activity, the ability for psychological self-regulation, and the use of effective methods for overcoming stress.

Conclusion.

The formation of a healthy lifestyle among students is based on a comprehensive analysis of individual health indicators, which should be taken into account for successful combating bad habits. In addition, to reduce stress, it is important to master useful information about methods of psychological self-regulation and be able to apply effective methods of overcoming stressful situations.

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PEDAGOGICAL SCIENCES

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PROJECT-BASED TEACHING METHODS TO ENHANCE THE EFFICIENCY OF ENGLISH LANGUAGE TRAINING FOR ENGINEERING TEACHERS

Abstract.
The article discusses project-based teaching methods to improve the efficiency of English training for future teacher engineers in non-language higher educational institutions of Ukraine. This method encourages active learning, critical thinking, and real-world application of language skills. One of the most promising approaches is to shift the focus from passive absorption of linguistic rules to active participation in meaningful tasks that simulate real-life professional situations. Integrating project-based learning into English language training for future engineering teachers offers a dynamic and context-relevant approach to education.

Keywords*: project-based teaching methods, technical content, real-life professional situations, implementation of innovative approaches, to enrich the educational experience, mastering professional grammar and vocabulary, interdisciplinary demands.*

Statement of the problem. In the context of globalization and the rapid development of science and technology, the demand for qualified professionals with strong communication skills in English has significantly increased. This is especially relevant for future engineering educators, who are expected not only to be proficient in their technical fields but also to communicate scientific and technical content effectively in English. One of the most promising approaches to enhance English language acquisition in this context is project-based learning (PBL). This method encourages active learning, critical thinking, and real-world application of language skills. They are expected to teach technical content, participate in international conferences, collaborate with foreign colleagues, and access the latest scientific literature, much of which is available only in English. Therefore, traditional language teaching methods often prove insufficient to prepare students for these demands.

Educational institutions are turning to innovative teaching strategies that integrate language acquisition with professional competencies. This method also shifts the focus from passive absorption of linguistic rules to active participation in meaningful tasks that simulate real-life professional situations. In this context, learning English becomes not an isolated academic activity, but a dynamic and purposeful process linked directly to the students' future careers as engineering educators.

Project-Based Learning allows students to develop not only language skills, but also critical thinking, teamwork, research, and presentation abilities. Through PBL, learners work on complex, open-ended projects that require them to apply both linguistic and technical knowledge. For engineering teacher training, such integration is especially valuable, as it mirrors the interdisciplinary demands of their future profession where language, teaching methodology, and engineering knowledge intersect.

Analysis of Recent Studies and Publications. Project-Based Learning is an instructional approach that organizes learning around projects. Students engage in exploring meaningful questions or challenges and work collaboratively to investigate and respond to complex problems. Unlike traditional methods that often focus on memorization and grammar drills, PBL emphasizes language use in authentic contexts. Through the implementation of projects, students develop both language proficiency and professional skills. In engineering education, project-based methods can simulate real-life tasks such as preparing technical documentation, giving presentations, writing reports, or collaborating on international engineering projects. Such an approach is highly effective because it integrates content and language learning (CLIL – Content and Language Integrated Learning), which is crucial for future educators who will teach or collaborate in multilingual environments [1-9].

Project-Based Learning (PBL) emphasizes student-centered inquiry, collaboration, and real-world application of knowledge. Instead of focusing solely on grammar rules or vocabulary memorization, PBL immerses students in meaningful tasks that culminate in a tangible product, presentation, or solution. This method transforms the learning environment into an active, engaging space where students take ownership of their educational journey.

Task Setting. At the core of PBL is the idea that learning is most effective when it is purposeful and contextualized. In the context of English language education, especially for students in technical or professional disciplines, PBL offers a way to bridge the gap between language and content. Projects often simulate real-life scenarios such as designing a technical presentation, writing a user manual, conducting research, or solving

a problem related to engineering or education. These tasks require students to use English not just as a subject of study, but as a tool for communication and problem-solving.

A typical PBL cycle begins with a central question or problem that guides the project. Students work individually or in groups to explore this problem, conduct research, and develop their responses or solutions. Throughout this process, language skills are developed naturally as students read texts, watch videos, discuss ideas, write reports, and present findings. The teacher acts as a facilitator, guiding the learning process, providing feedback, and ensuring that students remain on track [6].

For future engineering teachers this approach is particularly effective because it mirrors the way knowledge is applied in real professional settings. It fosters autonomy, encourages critical and creative thinking, and enhances communication skills — all within a meaningful, discipline-specific context. By integrating language learning with project work, students not only improve their English proficiency but also prepare for real-world teaching and technical communication challenges.

Integrating project-based learning (PBL) into English language training for future engineering teachers offers a dynamic and context-relevant approach to education. Given the dual focus of engineering and pedagogy in this specialization, it is essential that language instruction aligns with both technical communication and didactic skills. PBL provides an ideal framework for this dual development, allowing students to engage with authentic tasks that mirror their future professional responsibilities.

Highlighting previously unresolved parts of the overall problem. In the context of engineering teacher training, projects might include designing bilingual instructional materials, creating presentations on engineering topics, writing technical reports, or simulating classroom teaching sessions in English. Such activities help students develop their linguistic competencies while simultaneously reinforcing their subject knowledge and teaching methodologies. For example, a project may require students to explain complex engineering processes in simple English — a skill crucial for future educators working in multilingual or international environments.

Furthermore, PBL encourages teamwork, leadership, time management, and problem-solving — competencies that are highly valued in both engineering and teaching professions. Students learn to collaborate effectively, distribute tasks, communicate ideas clearly, and meet deadlines. These soft skills, combined with improved language proficiency, enhance their overall professional readiness.

Assessment in a PBL framework is also more comprehensive. Rather than relying solely on traditional testing, evaluation includes peer feedback, self-assessment, and teacher observations of both the process and the final product. This multi-dimensional approach helps capture a more accurate picture of each student's growth and engagement [9].

By embedding project-based methods into English language training for engineering teachers, educational institutions can cultivate professionals who are not only competent in their field but also confident and capable communicators. This approach helps bridge the gap between theory and practice, ensuring that future teachers are equipped with the tools needed to operate in modern, linguistically diverse academic and professional settings.

Being applied to the training of future engineering teachers, project-based methods provide opportunities for students to develop communication competencies in a foreign language related to their field. In the modern globalized world, the ability to communicate effectively in a foreign language is no longer a desirable skill—it is a professional necessity, especially for students preparing to enter technical and educational fields. Developing communication competencies in a foreign language related to one's area of specialization, such as engineering pedagogy, involves more than simply acquiring vocabulary. It requires mastering the specific linguistic, discursive, and intercultural tools necessary to engage in professional contexts confidently and accurately [5, 7].

For engineering teachers in training, communication competencies span several domains. Firstly, technical language skills are essential. These include the ability to describe processes, explain technical concepts, and understand technical documentation or academic articles in a foreign language—typically English. Mastering such skills enables future professionals to participate in international collaborations, access global research, and integrate innovations from foreign-language sources into their teaching and practice.

Secondly, future educators must be capable of explaining complex ideas in simple and accessible terms, leading discussions, and responding to students' questions. Developing these skills ensures that future teachers can operate in multilingual classrooms or participate in international academic exchange programs, thereby broadening their career opportunities and enhancing the quality of their instruction.

To build these competencies, language instruction must go beyond traditional grammar and reading tasks. Interactive methods such as simulations, role-playing, presentations, and project-based learning should be incorporated. Students might, for instance, present technical topics to classmates in English, create bilingual instructional videos, or analyze case studies from international contexts. Such activities promote practical language use and build confidence in real-life scenarios.

Ultimately, the development of foreign language communication competencies tailored to students' professional domains prepares them to be globally competitive specialists. It also promotes lifelong learning, as these individuals are better equipped to independently engage with international literature, participate in conferences, and grow within their disciplines.

One of the key components of effective language training for future engineering educators is the ability to use professional vocabulary accurately and fluently in realistic contexts. Professional vocabulary encompasses technical terms, discipline-specific collocations,

and expressions frequently used in engineering, education, and interdisciplinary communication. Mastery of such vocabulary not only reflects the speaker's knowledge of the field but also ensures clarity, precision, and credibility in both written and spoken communication [9].

To achieve this, language instruction should be deeply integrated with content from the students' area of specialization. For instance, learners should not only study terms like *stress analysis*, *load distribution*, or *welding technique*, but also use them in practical scenarios such as writing project reports, giving presentations, or engaging in simulated classroom discussions. This contextualized use fosters deeper cognitive processing, leading to improved retention and greater ease in applying the vocabulary spontaneously.

Simulations and task-based learning provide ideal environments for the application of professional terminology. Engineering students can role-play situations such as presenting a design solution to a team, conducting a peer review of a technical report, or explaining safety protocols during a lab session. These scenarios replicate real-world situations, thus preparing learners for the linguistic demands of their future professions.

Moreover, introducing authentic materials—technical articles, manuals, and videos—into the language classroom allows students to encounter vocabulary in its natural setting. Follow-up tasks such as summarizing, translating, or discussing these materials further consolidate vocabulary usage and promote critical thinking.

The integration of professional vocabulary into realistic communication tasks should be accompanied by regular formative assessment. This helps educators identify gaps in understanding and guides students toward greater fluency and accuracy. Teachers should encourage students to create personal glossaries and use vocabulary-learning tools that support contextual practice, such as digital flashcards with example sentences and pronunciation.

In the context of modern education and global workforce demands, the ability to collaborate effectively, demonstrate leadership, and solve complex problems is considered essential for future professionals, including engineering educators. Language training that integrates these competencies helps students not only to develop linguistic proficiency but also to build soft skills vital for real-world success. Collaboration in foreign language instruction involves working together to complete communicative tasks, solve case studies, or engage in project-based learning. Group activities, such as designing a technical solution or preparing a joint presentation, require students to exchange ideas, delegate responsibilities, and negotiate meaning—all while using the target language. These activities simulate workplace scenarios where teamwork across cultures and disciplines is necessary. Leadership skills can be developed by assigning rotating roles such as project manager, discussion facilitator, or team representative during collaborative tasks. When students are responsible for guiding peers, making decisions, or presenting group findings, they gain confidence in expressing their views, giving constructive feedback, and motivating others—skills that are crucial for teachers and engineers alike. Encouraging students to take initiative also promotes accountability and autonomy in learning. Problem-solving activities engage students in analytical thinking and require them to apply both language and subject knowledge to resolve realistic challenges. For example, learners can be tasked with identifying the causes of a technical failure described in a text, suggesting improvements, or developing an action plan to address a classroom management issue. These tasks not only enhance comprehension and vocabulary usage but also mirror the decision-making process in professional environments. Integrating these skills into English language education ensures that learning becomes relevant, active, and learner-centered. It prepares students to function effectively in multidisciplinary teams and to communicate solutions clearly and persuasively. Furthermore, by working through real-life problems in English, students improve their ability to think critically in a second language, an asset in international settings. Project-based learning (PBL) is a highly effective instructional method that encourages students to engage deeply with content by applying it to real-life contexts. For students in engineering and teacher training programs, preparing and presenting projects that replicate actual professional situations offers a dynamic way to acquire both language proficiency and practical skills. This method bridges the gap between theory and practice, providing learners with the opportunity to apply their knowledge in meaningful ways [8].

Regarding foreign language education, particularly English for Specific Purposes (ESP), students can design and present projects that simulate real-world teaching or engineering tasks. For instance, future engineering educators might be tasked with creating a lesson plan to teach a technical topic in English or designing a prototype for a classroom demonstration. These projects require them to use appropriate professional vocabulary, explain complex concepts clearly, and address the needs of a target audience—all in a foreign language.

Such projects can take various forms: a mock classroom lesson, an engineering design presentation, a safety briefing, or a workshop plan. Each format encourages the use of domain-specific terminology, logical structuring of ideas, and effective use of visual aids. These components reflect real communicative challenges that professionals encounter, thereby enhancing students' readiness for international work environments or bilingual teaching roles. Project preparation and presentation develop a range of competencies beyond language. Students must collaborate, research, synthesize information, and adapt their communication to different contexts. These experiences build confidence, critical thinking, and public speaking skills—essential attributes for both engineers and teachers. Projects also provide a platform for formative assessment, allowing instructors to observe students' progress and offer targeted feedback.

In summary, preparing and presenting projects that mimic real teaching or engineering scenarios not only reinforces linguistic skills but also fosters professional growth. By immersing students in authentic,

goal-oriented tasks, this approach supports deeper learning and prepares them for the multifaceted demands of their future careers.

For example, students can be assigned a project where they must design an English-language lesson on a technical topic (e.g., the principles of arc welding or renewable energy sources). They research the topic, prepare teaching materials, and present a mock lesson in English. This format not only reinforces technical knowledge but also trains them to explain complex concepts in a clear and accessible manner.

Another possible project might involve the preparation of a bilingual manual or video tutorial for a laboratory experiment, which can be used for international student exchanges. This type of activity ensures that future educators are equipped with practical, transferable skills. Project-Based Learning (PBL) has become a powerful and widely accepted instructional strategy across disciplines, including language education for future engineering and teaching professionals. This method emphasizes learning through active engagement in meaningful projects, allowing students to develop both linguistic and professional skills in a realistic context. The benefits of PBL are numerous and align closely with the goals of modern education, especially in non-linguistic higher education institutions.

One of the primary advantages of PBL is its ability to foster deeper understanding and retention of knowledge. When students work on projects that simulate real-life situations, they are more likely to internalize and remember the language and content used. For example, a project involving the design and presentation of a technical solution in English forces learners to engage with domain-specific vocabulary, grammar, and discourse structures in a practical and relevant way.

Another significant benefit is the development of transferable skills such as communication, collaboration, problem-solving, time management, and leadership. These skills are essential for future engineers and educators, who often work in team-oriented and interdisciplinary environments. Through project work, students learn how to express their ideas clearly, listen to others, provide constructive feedback, and resolve conflicts—all in a foreign language. PBL also encourages learner autonomy and motivation. By allowing students to take ownership of their learning process, select topics of interest, and make decisions throughout the project, they become more engaged and invested in their outcomes. Furthermore, PBL provides authentic assessment opportunities. Unlike traditional exams or quizzes, project-based evaluations focus on a student's ability to apply knowledge in real-world scenarios. Instructors can assess language proficiency, content mastery, creativity, and teamwork through presentations, written reports, and performance tasks, offering a more holistic view of student progress.

The use of project-based methods in English language instruction offers numerous advantages: working on meaningful projects increases student engagement and motivation, tasks simulate professional activities that students are likely to encounter in their careers, projects require analysis, evaluation, and synthesis of information, students practice all language skills (reading, writing, speaking, listening) in a cohesive manner, teamwork, leadership, time management, and presentation skills are improved.

In addition, engineering teacher students begin to understand the importance of multilingual communication in scientific and technical fields, making them more adaptable and competitive in the global labor market.

Despite its effectiveness, implementing project-based methods in language training comes with certain challenges: projects require more time and planning than traditional lessons. Not all students contribute equally in group work. Teachers should assign roles and evaluate individual contributions.

It also may be difficult to measure language proficiency through projects. It should be applied rubrics that assess language use, content knowledge, collaboration, and presentation skills. Project-based teaching methods represent a powerful tool for increasing the efficiency of English language training for engineering teachers. These methods promote meaningful use of language, foster interdisciplinary learning, and prepare students for the demands of professional life. Through the integration of language and content, future educators not only become proficient English users but also effective communicators, capable of teaching and working in diverse, multilingual environments.

To ensure success, it is essential to provide clear guidance, well-structured tasks, and ongoing feedback. Institutions should support this methodology through curriculum design, teacher training, and resource allocation. Ultimately, project-based learning empowers engineering teacher students to become competent, confident, and internationally minded professionals.

Conclusions and proposals. Project-based methods enrich the educational experience by combining language acquisition with professional development. They create an interactive and immersive learning environment that mirrors real-world challenges, preparing students for success in their future careers while significantly enhancing their English language competencies. Practicing collaboration, leadership, and problem-solving skills within the foreign language classroom equips future engineering educators with the tools to excel both linguistically and professionally. These competencies support their ability to teach, innovate, and lead in diverse educational and engineering contexts. This paper explores the benefits, implementation strategies, and challenges of using project-based teaching methods to enhance English language instruction for future teachers of engineering disciplines. By aligning language education with real-world professional tasks, this approach aims to increase both the efficiency and relevance of English language training in technical teacher education. The main pathway to enhancing education lies not merely in blending elements of various non-traditional teaching approaches, but in aligning and coordinating advanced methods for instructing different components of language learning. Achieving this calls for in-depth methodological research. Within this framework, educators are tasked with identifying effective strategies and techniques to overcome language

barriers and improve the psychological ease and comfort of the learning environment.

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PHILOLOGICAL SCIENCES

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THE ETYMOLOGICAL VARIABILITY OF THE NUMBER "ONE"

Abstract/
In world languages, the numeral system holds a special place. The expression of numbers that denote quantity is connected with various ideas. Numerals emerged from the practical needs of humans. Elements expressing quantity are found in ancient monuments, historical records, on coins, and on decorative items belonging to various peoples around the world. From this, it can be concluded that humans began counting in very ancient times.

Keywords: *The numeral system, etymology of numbers ,pronominal origin, a specific element, typological considerations.*

Introduction

It is assumed that the earliest numerals were "one" and "two". Other numbers were understood simply as "many". Gradually, people learned to count up to five, and then, by combining two fives, they could count up to ten.

When discussing the etymology of numbers, first and foremost the emergence and development of the numeral "one" must be examined.

It has been proven that in a number of Finno-Ugric languages, the word for "one" has a pronominal origin. For instance, according to D. Paijun, the Hungarian word egy stems from the demonstrative pronoun i meaning "this". Initially, it meant "here it is", then evolved to mean "the first", and finally, in semantic relation with the number "two", it acquired the meaning of "one".

According to the V.V Akulenko Hungarian word egy developed as follows: the root i of the demonstrative pronoun + e was used to express an indefinite thing, then became an indefinite pronoun, and eventually evolved into igy > egy, meaning "one". [2. 32]

Curiously, the numeral "one", which displays etymological variability, also has a pronominal origin in Finno-Ugric languages. R.H.Barens notes that e- pronominal roots are similar in both Finno-Ugric and Indo-European languages, in that they gave rise both to pronouns and to certain numerals.

[4. 12]

J. Hurford associates the word it in the Khanty language and akve in the Mansi language (both meaning "one") with other numerals of the first type [6. 16] . According to D. Stampe word it did not have a numerical function in ancient Khanty. Therefore, it can be assumed that the it type is not directly related to the numeral "one".[8. 16]

According to D. Stampe, the numeral "one" was used to emphasize a specific element and to distinguish one object from another. In the Proto-Slavic period, this meaning was expressed by combining the word "one" with the prefix ed-.

The idea that the indefinite pronoun was primary contradicts the fact that the numeral "one" has the same function even in languages where it does not originate from pronouns. Data from the Nivkh and Kachin languages, where the pronominal origin is evident, also do not contradict the notion of definiteness. That is, the common origin of personal and demonstrative pronouns has been discovered in languages around the world.

Considering the above and the fact that indefinite pronouns are recent derivations in many world languages, it is more accurate to view the indefinite meaning of "one" as secondary in terms of quantity.

The plural meaning of the numeral "one" has also been determined. As we have seen, in some languages, this numeral once expressed unity. The plural meaning of "one" is not used freely, but rather in derivations such as "to unite", "together".

In Turkic languages, the word "bir" (one) has a broad and diverse scope of use. It is hard to find any page of a literary, scientific, or scholarly text in which the word "bir" does not appear. In Azerbaijani, this word is used very frequently. Notably, in S. Vurgun's poem Aygün, the word "bir" and its derivatives are used approximately 550 times. This highlights both the semantic richness and the functional diversity of this word in our language.

In English, the word "one" appears in the following variations:

1. Numerical Use:

In English, "one" is primarily used as the first of the numbers. It serves to express the quantity or amount of an item.

Examples:

•It took a week.

•An hour passed.

•She was a beautiful young girl.

2. As an Indefinite Article ("a" / "an"):

When used between components of a noun phrase, "one" loses its original meaning and becomes an indefinite article, emphasizing generality and strengthening the nuance of judgment.

Example:

•We would climb a mountain; a strong wind embraced him.

Compare:

•a big house vs. big house (with zero article).

The phrase a big house emphasizes that a specific large house is being referred to, whereas a big house (as in "bir böyük ev") can suggest the house is not only large, but it is also indefinite — one among many. The differences are subtle and often hard to express clearly in English.

3. As a Pronoun or Adjective Equivalent to "same":

Without any suffix, "one" can also be synonymous with "same" or "identical". In this case, it may denote that actions happen in the same place or that items are similar or identical.

4. In Fixed Expressions:

In Modern English, some fixed expressions necessarily use the indefinite article "a" before nouns. In these cases, the article becomes a fossilized, inseparable part of the phrase.

Examples:

•in a hurry, to get in a fury, to take a fancy, in a low voice, a great many, a great deal, to have a mind, to have a good time, as a result, to be at a loss.

Typological Considerations:

One of the widely used classifications in linguistics is typological classification. This is based on the structural characteristics of languages. When typological classification is applied, features such as phonetic system, vocabulary, and grammatical structure are considered, and similarities and differences are identified.

A language type is determined by dominant features observed at all levels of a language. According to V. D. Arakin, a language type is the totality of features linked by specific relations. The presence or absence of one feature implies the presence or absence of others.

The purpose of typological study in linguistics is to classify languages based on their structural characteristics, including word morphology, word formation, and sentence structure. Based on these criteria, various language types are identified.

Numerals and Typology:

Typological features of numeral systems vary across languages. The classification of numerals within parts of speech systems is complex and requires special investigation. There are varying views regarding the classification of quantity-denoting words, including numerals.

Quantity is one of the most important cognitive categories of human perception. Like other categories of cognition, quantity is reflected in linguistic studies as a crucial concept.

Measure Words in English:

Modern English includes "measure words," which are often seen as variants of the numeral "one." These can be used with both countable and uncountable nouns.

Examples:

•a can of soup, a pound of meat, a slice of bread, an ear of corn, a grain of wheat, a pint of blood, a bottle of perfume, a stick of deodorant, a jar of paste, a tube of toothpaste.

Some of these can be pluralized:

•one slice of toast, two slices of toast, etc.

Depending on their structure, some measure expressions can be both countable and uncountable:

•a bar of chocolate, a box of chocolates.

Typical quantity-denoting phrases include:

•a slice of cake, a roast of meat, a bowl of soup, a bowl of wine.

The term slice refers to dividing or cutting a whole object into parts — often thin or wide segments:

•a slice of apple, a slice of one's earning, a slice of lemon, etc.

His whole face screws up when he sees someone eat a slice of lemon.

Soon after five p.m we had another meal consisting of a small mug of coffee and a slice of brown bread.

A piece (of) ölçü, hissə,meyar bildirən sözlər qrupuna aiddir.

1.parça tikə,bir parça

piece of bread,a piece of chalk ,a piece of paper,

2.hissə:

A piece of road

A piece of road is under repair.

3.sahə:

A piece of potatoes

4.dənə :

A piece of furniture

Measure Words and Countability in Modern English

In English, certain phrases containing "a piece (of)" belong to a group of expressions that indicate measurement, portion, or unitization of uncountable nouns. These expressions make it possible to treat otherwise uncountable nouns as countable. Below are the primary meanings and usage patterns of "a piece (of)":

1.Portion or Part (Parça, tikə):

•a piece of bread, a piece of chalk, a piece of paper

2.Segment or Section (Hissə):

•a piece of road

•A piece of road is under repair.

3.Area or Field (Sahə):

•a piece of land, a piece of potatoes

4.Single Unit / Item (Dənə):

•a piece of furniture

Modern English contains a wide variety of measure expressions that allow speakers to treat uncountable nouns as if they were countable. These expressions typically consist of a quantifying word followed by "of" and the noun. One of the most commonly used among them is "a bit of".

Examples:

•She bought an attractive old piece of furniture at the auction sale.

•How many pieces of luggage have you got with you?

•Chapin wrote some wonderful pieces of music.

•I heard a really useful bit of information yesterday.

•Before you go to England, I should give you some bits of advice.

•He spends all his money buying new bits of computer equipment.

Measure Words in Daily Use:

These expressions are frequently encountered in everyday contexts, including:

Grocery-related expressions:

•a loaf of bread, a slice of cake, two bars of chocolate, two cartons of milk, three bars of soap

Nature-related expressions:

•Let's go out and get a breath of fresh air.

•Look at the ladybird on that blade of grass.

•She blew little puffs of smoke out of her cigarette straight into my face.

•Put another lump of coal on the fire.

Are "a piece" and "a slice" the same?

It is often said that there is no significant difference between "a piece" and "a slice" in certain contexts. For example:

•a slice of cake = a piece of cake

•a slice of cheese = a piece of cheese

•a slice of bread = a piece of bread

In everyday spoken English, these expressions are functionally interchangeable and both are widely accepted. However, in more specific contexts, "slice" often implies something that has been cut into thin, flat portions, whereas "piece" is a more general term for any part of a whole.

Examples in Sentences:

•His whole face screws up when he sees someone eat a slice of lemon.

•Soon after five p.m., we had another meal consisting of a small mug of coffee and a slice of brown bread.

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ECONOMIC SCIENCES

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ЗНАЧИМОСТЬ РАЗВИТИЯ ПРОМЫШЛЕННОСТИ В РЕГИОНАХ И ОСНОВНЫЕ НАПРАВЛЕНИЯ ИХ ЭФФЕКТИВНОГО ИСПОЛЬЗОВАНИЯ

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THE IMPORTANCE OF INDUSTRIAL DEVELOPMENT IN THE REGIONS AND THE MAIN DIRECTIONS FOR THEIR EFFECTIVE USE

Аннотация.
В статье освещены экономические тенденции и факторы, влияющие на развитие промышленности в Андижанской области Республики Узбекистан, основанные на весе промышленного производства и региональной специализации. В ходе развития региона отрасль изучалась и анализировалась. На основе доходов региона предложены направления развития.

Abstract.
The article highlights economic trends and factors influencing the development of industry in the Andijan region of the Republic of Uzbekistan. During the development of the region, the industry was studied and analyzed. Based on the region's income, development directions are proposed.

Ключевые слова: *региональная промышленность, промышленное производство, региональная промышленная специализация, внутренние возможности и возможности.*

Keywords: *regional industry, industrial production, regional industrial specialization, internal capabilities and capabilities.*

С первых лет независимости в нашей стране проводилась целенаправленная территориальная политика, осуществлялись глубокие институциональные изменения. Сегодня принимаются меры по комплексному развитию регионов, реализуются целевые региональные программы.

Логическим продолжением данных территориальных реформ в январе 2017 года было принято Постановление Кабинета Министров Республики Узбекистан «Об утверждении положения об информационно-аналитическом управлении по вопросам комплексного социально-экономического развития территорий». принят, а к февралю 2017 года Указом Президента Республики Узбекистан №ПФ-4947 «В 2017-2021 годах в Республике Узбекистан Были приняты «Стратегия действий по пяти приоритетным направлениям развития»[1] и Постановление №ПФ-60 от 28 января 2022 года «О новой стратегии развития Узбекистана на 2022-2026 годы» [1].

В третьем направлении данной стратегии определен ряд приоритетных задач, таких как устойчивое развитие промышленности региона, строительство новых промышленных предприятий, устойчивое развитие экономики региона за счет увеличения экспортного и промышленного потенциала, создание благоприятных условий для размещения производств. . Эти задачи заключаются в полной реализации экономических интересов хозяйствующих субъектов региона, оптимизации производства , укреплении внутри- и межотраслевой кооперации и расширении процессов локализации, а также эффективно и в полной мере использовать возможности этого сектора, быть конкурентоспособными на рынке. вопросы увеличения производства местной продукции, развития межрегиональной промышленной кооперации, обеспечения роста занятости населения за счет более широкого использования внутренних возможностей регионов и повышения материального благосостояния на этой основе. - приобретает все большее значение в региональной экономической политике.

ПФ-60 от 28 января 2022 года «О третьем направлении новой стратегии развития Узбекистана на 2022-2026 годы «ОБЕСПЕЧЕНИЕ ОПЕРЕЖАЮЩЕГО РАЗВИТИЯ И ВЫСОКИХ ТЕМПОВ РОСТА НАЦИОНАЛЬНОЙ ЭКОНОМИКИ» прилагаются от 21 до 36 целей. В новой стратегии развития поставлены следующие цели для промышленности: Цель 22: Увеличение объёмов промышленного производства в 1,4 раза, продолжение промышленной политики, направленной на обеспечение стабильности национальной экономики и увеличение доли промышленности в валовом внутреннем продукте. продукт.

Цель 24: Бесперебойное обеспечение экономики электроэнергией и активное внедрение технологий «Зеленой экономики» во все отрасли, повышение энергоэффективности экономики на 20%.

Цель 28: Республики экспорт потенциал увеличивать Республики в 2026 году через экспорт объемы 30 миллиардов США к доллару доставить

Цель 29: Предпринимательство деятельность организовать делать и постоянный доход источники формирование для условия создать , частное сектора валовой внутренний в продукте доля до 80 процентов и в экспорте доля до 60 процентов доставить

Сегодня отрасль дает возможность эффективно решать такие задачи, как обеспечение необходимого баланса на рынке, повышение конкурентоспособности экономики и доходов населения, локализация производства, а также эта отрасль играет важную роль в создании рабочих мест. В частности, создание одного рабочего места в обрабатывающей промышленности приводит к созданию двух-трех рабочих мест в других отраслях[3].

Динамичность производственной сети оказывает существенное положительное влияние на развитие других отраслей и секторов экономики. В частности, развитие пищевой и легкой отраслей промышленности стимулирует развитие сельского, лесного и рыбного хозяйства. [6].

Оценка развития промышленности и ее отраслей в регионах – сложный экономический процесс, и это развитие нельзя измерить одним показателем. Поэтому при оценке развития промышленности региона целесообразно учитывать различные тенденции ее развития, и данная система показателей отражена в таблице ниже (см. таблицу 1).

Таблица 1

Система показателей, характеризующих уровень развития промышленности региона. [6].

<table>
<tr><th colspan="4">Индикаторы</th></tr>
<tr><th>1-й заказ</th><th>2-й порядок</th><th>3-й порядок</th><th>4-й порядок</th></tr>
<tr><td colspan="4">Экономические показатели</td></tr>
<tr><td>Объем промышленного производства на душу населения</td><td>Индекс промышленного производства</td><td rowspan="4">Индекс развития реального сектора</td><td rowspan="4">Индекс экономической активности</td></tr>
<tr><td>Объем экспорта на душу населения</td><td>Индекс экспорта</td></tr>
<tr><td>Производительность труда в промышленности</td><td>Индекс производительности труда</td></tr>
<tr><td>Занятость в промышленности, тыс. человек</td><td>Сетевой индекс занятости</td></tr>
<tr><td colspan="4">Технологические показатели</td></tr>
<tr><td>Производительность капитала</td><td>Индекс производительности капитала</td><td rowspan="3"></td><td rowspan="3">Индекс технологического уровня</td></tr>
<tr><td>Капиталоемкость промышленного производства</td><td>ИКОР</td></tr>
<tr><td>Количество патентов, полученных из сети (на 100 000 человек)</td><td></td></tr>
<tr><td colspan="4">Индикаторы объекта</td></tr>
<tr><td>Количество объектов в сети</td><td>Уровень занятости</td><td rowspan="4">Производственная функция</td><td rowspan="4">Общая факторная производительность (TFP)</td></tr>
<tr><td>Стоимость капитальных производственных фондов</td><td rowspan="2">Капиталоемкость и доходность</td></tr>
<tr><td>Инвестиции в основной капитал</td></tr>
<tr><td>Природно-сырьевые ресурсы</td><td>Уровень обеспеченности территории</td></tr>
</table>

Продолжение таблицы 1

Показатели проекта			
Количество проектов по созданию высокотехнологичного производства	Доля наукоемкой продукции в объеме промышленного производства	Интегральный индекс диверсификации	**Индекс открытости экономики**
Количество высокотехнологичных производственных проектов	Доля наукоемкой продукции в объеме промышленного производства		
Участие отечественных субъектов предпринимательства в крупных инвестиционных проектах	Коэффициент участия региона в крупных инвестиционных проектах		
Количество проектов локализации	Коэффициент локализации		
Количество проектов по расширению экспорта	Доля продукции, предназначенной для нового экспорта, в объеме промышленной продукции	Интегральный показатель расширения экспорта	
Доля экспорта в ВВП	Коэффициент экспортной ориентации экономики		
Доля прямых иностранных инвестиций в общем объеме инвестиций	Коэффициент участия в иностранных инвестициях		
Количество действующих предприятий с участием иностранного капитала			

На основании указанных выше факторов можно сказать, что каждый регион будет обладать собственным производственным потенциалом, в связи с чем уровень промышленного производства одного региона будет выше уровня промышленного производства другого региона или наоборот.

Основные цели программ социально-экономического развития регионов: рациональное использование неиспользованных резервов и возможностей регионов, а также имеющихся богатых сырьем и ресурсами ресурсов, обеспечение развития производств в целостной связи с регионами, с использованием действующие промышленные предприятия на полную мощность, а также Организация производства в существующих зданиях и сооружениях, диверсификация производства и глубокая переработка существующего сырья, выпуск высокотехнологичной продукции с высокой добавленной стоимостью и создание новых рабочих мест. Благодаря организации население ориентируется на решение таких вопросов, как повышение уровня занятости[5].

При разработке этих программ основное внимание уделяется следующим направлениям [4]:

- для комплексного развития регионов - анализ условий в среднесрочной перспективе, оценка их воздействия, выявление существующих принципов и проблем;

- система целевых индикаторов, разработанная с использованием современных методов разработки социально-экономических прогнозов, связь целевых индикаторов с важнейшими целевыми программами развития, реализуемыми и разрабатываемыми;

- разработка конкретных мер по достижению поставленных целей с учетом конкретных источников финансирования.

В программах социально-экономического развития предусмотрено коренное улучшение региональной организации промышленного производства на основе:

- освоение новых месторождений и увеличение запасов минерально-сырьевой базы, внедрение современных, энергосберегающих, высокоэффективных технологий добычи и переработки минерально-сырьевого сырья в стратегически важных отраслях промышленности - нефтегазовом комплексе и горнодобывающей промышленности. промышленность, обеспечивающая устойчивое развитие за счет;
- расширение экспортно-ориентированного производства на основе конкурентных преимуществ районов , организация новых производств в отрасли строительных материалов, соответствующих мировым стандартам качества;
- на основе использования местного сельскохозяйственного сырья, прежде всего, бурное развитие перерабатывающих производств в текстильной промышленности, увеличение объемов переработки хлопкового волокна на предприятиях нашей страны;
- широкое развитие и размещение в регионе

малых предприятий и микропредприятий, филиалов крупных предприятий по переработке местного сырья и производству конкурентоспособной готовой продукции [7]..

В программах развития регионов предусмотрено, что развитие промышленных предприятий будет приоритетным во всех городах и районах областей, а в результате рациональной координации программ развития отраслей и реализации конкретных инвестиционных проектов проектов будут достигнуты структурные изменения, связанные с размещением промышленных предприятий[6].

В Андижанской области в 2022-2026 годах объем валового регионального продукта и промышленной продукции увеличится в 1,4 раза, производство сельскохозяйственной продукции – в 1,2 раза, объем услуг – в 3,0 раза, объем строительных работ – в 1,4 раза. Разработаны параметры целевых индикаторов в разрезе районов.

Совместно с Министерством экономики и финансов, Министерством инвестиций и внешней торговли и Правительством Андижанской области:

Разработаны конкретные целевые меры по достижению параметров утвержденных целевых индикаторов на 2022 год;

Ежегодно до 1 ноября комплексные меры, направленные на обеспечение целевых параметров предстоящих лет и реализацию «дорожной карты», должны вноситься на утверждение Кабинета Министров [5].

В 2022-2026 годах перед органами местного самоуправления поставлены следующие задачи по обеспечению эффективной реализации разработанных программ:

- регулярно изучать проблемы, препятствующие реализации проектов, включенных в программы, и принимать меры по их своевременному устранению, любых проблем, возникающих в ходе реализации и эксплуатации проектов, устранение бюрократических препятствий;

- эффективная организация процессов получения достоверной информации о пустующих или неэффективно используемых зданиях и сооружениях в регионе в короткие сроки и представление ее субъектам хозяйствования;

- уделить внимание процессам подключения реализуемых в регионе проектов к энергетическим, газо-, водо- и канализационным, теплоснабжающим и другим аналогичным инженерно-коммуникационным сетям и применять передовой опыт в этом отношении;

- определить особенности каждого региона и мобилизовать на их основе все имеющиеся возможности для создания более благоприятной среды для инициаторов проектов для формирования новых проектов на следующий год;

- определять имеющиеся возможности для развития организуемых проектов, особенно в микрорайонах, и определять пути их реализации, на этой основе рекомендовать образцовые формы организации проектов и поддерживать их;

- Ориентация на совершенствование состава проектов, включенных в программы по видам деятельности, в частности, на организацию современных производственных сетей, основанных на высоких технологиях в промышленном секторе;

- решение задач по расширению своего участия в сфере внешнеэкономической деятельности путем оказания конкретной и эффективной поддержки проектам, достигшим производства продукции на экспорт в регионе;

мобилизовать все возможности для увеличения производства продукции с высокой добавленной стоимостью за счет эффективного использования существующего сырья и тщательной его переработки при формировании новых проектов на следующий год ;

- создание не менее 3-х предприятий по переработке сырья этого вида в районах с богатой сырьевой базой мяса, молока и плодоовощей, но без единого предприятия по их переработке;

- при определении стратегического направления промышленной политики в регионах, во-первых, ориентироваться на ликвидацию производств в технически и технологически отсталых регионах, во-вторых, на оснащение предприятий современными, новейшими достижениями техники и технологий.

В 2022 году он будет реализован на основе комплексных мероприятий по развитию инженерно-коммуникационной, производственной и сервисной инфраструктуры, а также строительству, реконструкции и ремонту объектов социальной сферы Андижанской области [5].

В рамках данного решения Министерство экономики и финансов планирует выделить средства из республиканского бюджета.

Финансирование проектов, реализуемых за счет средств местного бюджета хокимията Андижанской области, в указанные сроки.

Словом, для обеспечения региональной стабильности и экономического роста, осуществления глубоких структурных изменений в регионах и достижения запланированных параметров регионального прогноза можно эффективно использовать потенциал региональной промышленности и быстрее достичь поставленной цели. показывает свой полный эффект только в том случае, если вышеуказанные мероприятия проводятся комплексно.

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