Studia Lednickie
t. XXIV (2025), s. 143-163
PL ISSN 0860-7893; e-ISSN 2353-7906

DOI: https://doi.org./10.34698/sl.24.2025.07

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A Case Study of Childhood Metabolic Stress in 11th–12th Century Giecz, Poland

Studium przypadku stresu metabolicznego u dzieci w Gieczu w XI–XII wieku w Polsce

Abstract: The article presents a case of a child burial discovered at the early medieval cemetery in Giecz (site Gz 10). The grave contained the remains of a child who died at approximately 2 – 4.5 years of age. Detailed anthropological analysis revealed numerous pathological changes, indicating that the individual experienced chronic metabolic stress, malnutrition, or a disease that affected skeletal development. After excluding other possible conditions, it was concluded that the most probable causes of the observed lesions were scurvy, anaemia, and/or nonspecific infections. This case study provides preliminary observations on the health of a child during the early Piast period in Poland to enhance our understanding of the living conditions of populations inhabiting this region during a time of significant sociohistorical transformation.
Keywords: early medieval cemetery; anthropological analysis; pathological changes; scurvy

Abstrakt: Artykuł przedstawia przypadek pochówku dziecka odkrytego na wczesnośredniowiecznym cmentarzysku w Gieczu (stan.10). W grobie złożono dziecko zmarłe w wieku około 2-4,5 roku. Szczegółowa analiza antropologiczna ujawniła liczne zmiany patologiczne, świadczące, że doświadczało ono przewlekłego stresu metabolicznego, niedożywienia lub choroby, która wpłynęła na rozwój jego szkieletu. Na podstawie wykluczenia innych możliwych schorzeń ustalono, że najbardziej prawdopodobną przyczyną obserwowanych zmian były szkorbut, anemia i/lub nieswoiste infekcje. Niniejsze studium przypadku dostarcza wstępnych informacji dotyczących stanu zdrowia dzieci w Polsce w okresie wczesnopiastowskim i poszerza naszą wiedzę o warunkach życia społeczności żyjących w tym regionie w czasie istotnych przemian społeczno-historycznych.
Słowa Kluczowe: cmentarzysko wczesnośredniowieczne, analiza antropologiczna, zmiany patologiczne, szkorbut

Introduction

Metabolic stress during childhood is a common theme in medieval bioarchaeological research, often being linked to malnutrition, chronic diseases, and/or physiological stress during growth and development. In Poland, studies from sites in Ostrów Lednicki [Krenz-Niedbała 2009, 2016] and Kałdus [Tuggle et al. 2021] have documented evidence of scurvy, anaemia, and rickets in juveniles. This suggests that during growth and development, a juvenile skeleton is especially susceptible to environmental and socio-political instability. These pathologies help reveal how diet, disease, and living conditions shaped juvenile skeletons and informs on how early medieval communities were adapting to ecological, political, and religious transitions.

The purpose of this paper is to discuss a single case study regarding a child burial from the medieval cemetery at Giecz (site Gz10) exhibiting skeletal evidence of metabolic stress. By documenting and analysing these skeletal lesions, the goal of this study is to add a broader understanding of the prevalence of physiological stress during early growth and development in early medieval Poland. While this case study sample represents one individual, it demonstrates the importance of incorporating paleopathological evidence with historical and archaeological data to better understand the living conditions and health of children during the early Piast period.

Historical Background

Giecz (52° 19′ 15″ N, 17° 22′ 25″ E) is situated in Wielkopolska (Greater Poland) and is one of the most politically and religiously significant regions of the early Piasts, the first historical ruling dynasty of Poland (see *History of Poland during the Middle Ages (2015)* for a broader historical review of the period). Archaeological and historical data indicate Giecz was an important stronghold during the beginning of the Piast dynasty (11th and 12th centuries) [Bukowska 2018], a period when Poland was transitioning into the broader European Christian world. The process of Christiansation began with the baptism of Mieszko I in 966 after his marriage to Dobrawa from Bohemia [Buko 2021; Gallus 2003; Manteuffel 1982], introducing the country to religious changes that reshaped political and social structures in Europe [Buko 2021; Urbańczyk 2021; Vercamer, Zupka 2022]. During the Piast dynasty, Greater Poland became a political and religious centre, where fortified strongholds were built in Gniezno, Poznań, Ostrów Lednicki, and Giecz (fig. 1) [Kara et al. 2016]. These strongholds formed a network of key administrative and defensive locations, functioning as hubs for political and military power, trade, and religion [Górecki 1992]. In this region, archaeologists have discovered artefacts that allow for the study of how social transformations, such as Christiansation, consolidation of power, and access to resources, may have impacted population health.

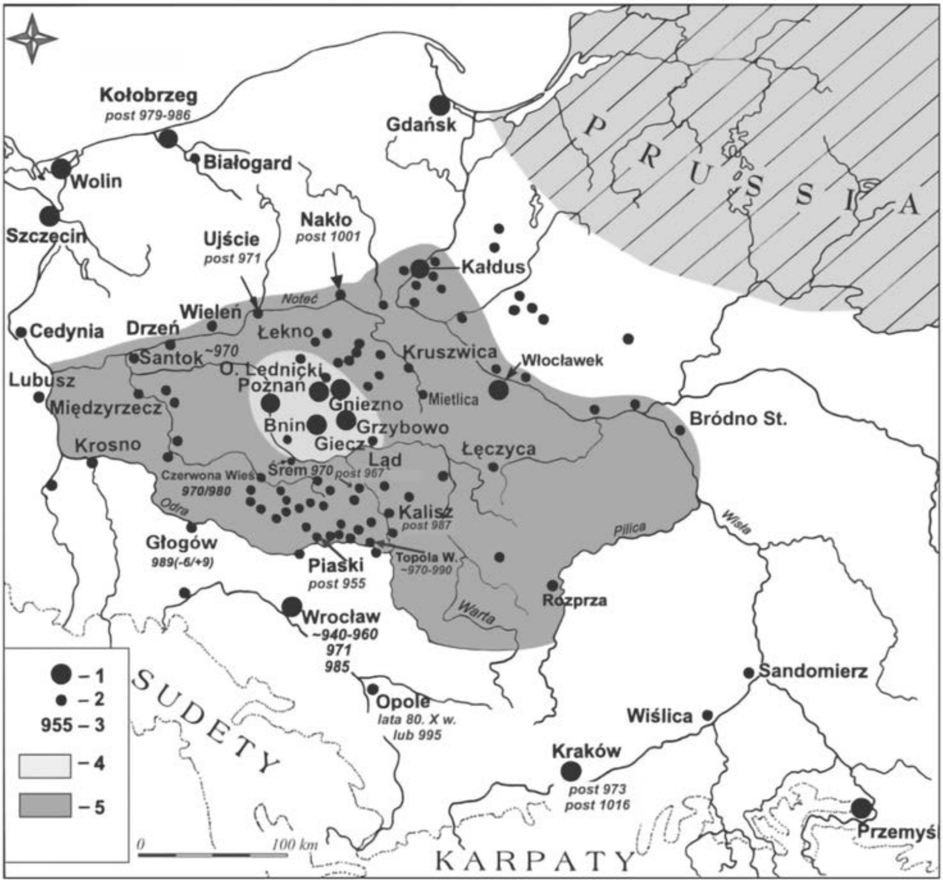

Fig. 1. Map of Mieszko I's state (c. 960-992), showing the location of Giecz and other Piast strongholds (Gniezno, Poznań, Ostrów Lednicki). Based on Z. Kurnatowska [2002] and M. Kara [2009], as modified in M. Kara [2020]

Ryc. 1. Mapa państwa Mieszka I (ok 960-992) z lokalizacją Giecza oraz innych grodów piastowskich (Gniezno, Poznań, Ostrów Lednicki). Na podstawie Z. Kurnatowska [2002] i M. Kara [2009], zmodyfikowane według M. Kara [2020]

Site Background

During the 9th century, the Giecz hillfort was located on a peninsula jutting out into a lake formed by the Moskawa River [Miciak, Agnew 2021]. Over the centuries, the Moskawa River has decreased in size, and what was once a lake became a swampy wetland. Currently, Giecz's medieval cemetery is located under farmland, about 0.5 km north-west of the stronghold (fig. 2) [Miciak, Agnew 2021], where intensive agricultural activity threatens its integrity. Rescue excavations at Gz10 began in the fall of 2014 and have continued every summer since its identification [Miciak, Agnew 2021]. To date, 238 graves have been excavated between 2014 to 2025, including 115 (48.3%) adults and 123 (51.7%) children. The medieval cemetery site in Giecz, Gz10, provides an important glimpse into biological changes during the period of Poland's state formation.

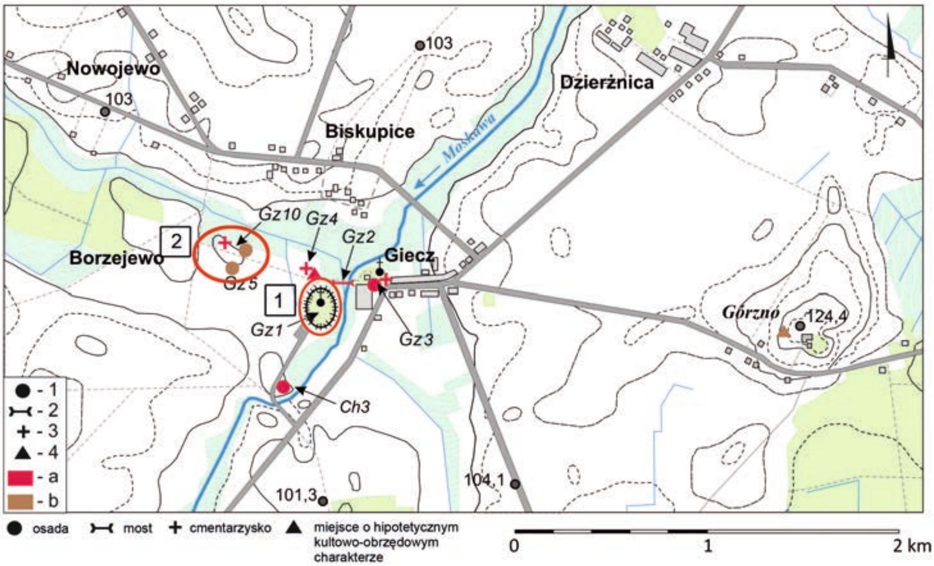

Fig. 2. Location of the Giecz 10 site and the Early Piast settlement [Krysztofiak 2016]: 1 – the stronghold, 2 – the Giecz 10 site. Prepared by L. Hayden

Ryc. 2. Lokalizacja stanowiska Giecz 10 oraz grodu wczesnopiastowskiego [Krysztofiak 2016]: 1 – gród, 2 – stanowisko Giecz 10. Oprac. L. Hayden

The ongoing rescue excavation is working to recover, study, and preserve the skeletal remains and material goods of the individuals buried in the cemetery. The fieldwork is part of the project *Saving the Early Piast Necropolis*, organised by the Museum of the First Piasts in Lednica and directed by Magda Miciak, an archaeologist from The Archaeological Reserve – Early Piast Stronghold in Giecz. The project is supported by the Slavia Foundation, which organises a summer field school that allows international students to gain experience in bioarchaeology. Given the historical context of the site, this has been an important collaborative effort to preserve some of the earliest traces of Poland's state formation and offers a rare opportunity to study the lives of individuals who inhabited and died in the region during this period of political transformation. Through osteological analysis, this manuscript presents a case study on childhood vulnerability in early medieval Poland and contributes to larger discussions of health disparities and stress in medieval Europe.

In 2017, the grave of the child that is the focus of this study (Burial 17/17 – fig. 3 and 4) was exhumed. The skeletal remains exhibited disturbance from plough damage caused by agricultural activity [Miciak, Agnew 2021]. Items found inside this burial included several beads and eight temporal rings [Miciak, Agnew 2021]. While temporal rings are common in burials at this site and are typically associated with female burials, it is rare for more than 2-3 to be found accompanying individuals. The high number of temporal rings in this burial suggests that it represents an individual with uncommon status, prompting further analysis of the skeletal remains to characterise aspects of their experienced life that can be related to its unique burial context. Based on grave goods, the burial is dated to the early Middle Ages (11th-12th centuries).

Fig. 3. Plan of the Giecz 10 cemetery site, with grave no. 17/17 highlighted (red oval): 1 – position of the skull; 2– burial pit; 3 –grave without a clear burial pit; 4 – grave 17/17; 5 – an earlier medieval feature; 6 – modern feature. Prepared by M. Miciak

Ryc. 3. Plan cmentarzyska Giecz 10 z zaznaczonym grobem nr 17/17 (czerwony okrąg): 1 – orientacja czaszki; 2 – wkop grobowy; 3 – grób bez czytelnego wkopu grobowego; 4 – grób nr 17/17; 5 – obiekt wczesnośredniowieczny młodszy; 6 – obiekt nowożytny. Oprac. M. Miciak

Fig. 4. Grave no. 17/17, Giecz 10. Photo by M. Miciak
Ryc. 4. Grób nr 17/17, Giecz 10. Fot. M. Miciak

Biological profile and paleopathology

The child skeleton has good overall preservation and is approximately ninety percent complete; however, the regions of the right thorax and upper extremities were damaged due to agricultural activity. Age at death was estimated using multiple methods to account for differences in the expression of growth rates. Dental development was analysed using AlQahtani's [2008] atlas of tooth development and eruption, leading to an age estimate of 4.5 ± 1.0 years. Long bone lengths were evaluated against Maresh [1970], which suggested an age range of 2 – 3.5 years. Epiphyseal fusion was assessed using Scheuer et al. [2009], which suggested age at death consistent with the long bone metrics. The difference in age estimates between dental and postcranial methods is typical for children in this region [Agnew and Justus 2014]. The final age determination considered all data and resulted in an estimate of 2-4.5 years.

Paleopathological assessment involved the visual inspection of all available skeletal elements: cranium, mandible, dentition (ULdi2-ULdm2, URdi1-URdm2, LLdi, LLdc-LLdm2, LRdi2-LRdm2), left humerus with proximal epiphysis, left radius, left ulna, left and right ilium, left pubis, left ischium, four sacral segments, five lumbar vertebrae, five cervical vertebrae, nine thoracic vertebrae, three right ribs, 12 left ribs, left scapula, left and right femora with distal epiphyses and left proximal head epiphysis, left and right tibiae with proximal epiphyses, left and right fibula, four left carpals, left first metacarpal, left third – fifth metacarpals, five left proximal phalanges, four left intermediate phalanges, one intermediate right phalanx, three left distal phalanges, and two metatarsals.

All evidence of atypical porosity, periosteal new bone (PNB), bone reabsorption, irregularity or deformity, was documented and recorded. Macroscopic examination showed that multiple skeletal elements were affected by pathological changes. In the cranium, healed bilateral cribra orbitalia [Lewis 2018; Mangas--Carrasco, López-Costas 2021; Buikstra 2019] were present along the superior aspects of the orbits (fig. 5), with a more extensive lesion on the right. The bilateral orbital lesion morphology is most consistent with anaemia deficiencies, but scurvy cannot be ruled out due to lesion asymmetry (Klaus 2017; Mays 2018; Mays, Brickley 2018). Diffuse porosity was also observed across the hard palate and anterior maxillae (fig. 6), as well as around the nasal aperture. Additional cranial lesions included bilateral porosity on the temporal bones (superior to the external auditory meatus extending posteriorly over the mastoid process) (fig. 7), porosity along the external surface of the pars basilaris and pars lateralis, and periosteal new bone (PNB) [Buikstra 2019; Snoddy et al. 2018] formation along the internal occipital crest. The greater wings of the sphenoid exhibited extensive porosity extending onto the adjacent frontal and parietal bones (fig. 7). Bilateral porosity was observed on the mandible at the mental eminence and the medial ramus, inferior to the coronoid process.

Enamel defects [Goodman and Armelagos 1985; Hillson and Bond 1997; Lewis 2018] were present in the form of linear enamel hypoplasia (LEH, horizontal depressions from growth disruptions) and cuspal/plane-form hypoplasia (large portions of enamel are not fully formed) in the deciduous dentition. LEH were observed on the left lower central incisor (LLi1) and cuspal hypoplasia were observed on the right upper molar 1 (RUdm1), right upper canine (RUc), left upper canine (LUc), and left upper molar 1 (LUdm1). These defects are more likely to be attributed to disruptions during growth and development than caused by use during life [Skinner, Hung 1989].

In the postcranial skeleton, lesions included porosity on the left ilium (superior to the auricular surface), bilateral cribra femora (fig. 8), lateral bilateral femoral flaring (fig. 8), and bilateral porosity (lattice-like appearance) on the distal femora metaphysis (fig. 8). Furthermore, the medial shaft of the right femur has a 4.5 cm smooth periosteal lesion (fig. 9) and the posterior midshaft of the left tibia has a 4 cm periosteal lesion with a rough inferior margin (fig. 10).

Fig. 5. Grave no. 17/17. Anterior image of bilateral *cribra orbitalia* in the orbits. Photo by M. Jóźwikowska

Ryc. 5. Grób nr 17/17. Obustronna *cribra orbitalia* w stropach oczodołów. Fot. M. Jóźwikowska

Fig. 6. Grave no. 17/17. Superior view of the porosity on the hard palate of the maxilla. Photo by M. Jóźwikowska

Ryc. 6. Grób nr 17/17. Zmiany porotyczne na podniebieniu kostnym szczęki. Fot. M. Jóźwikowska

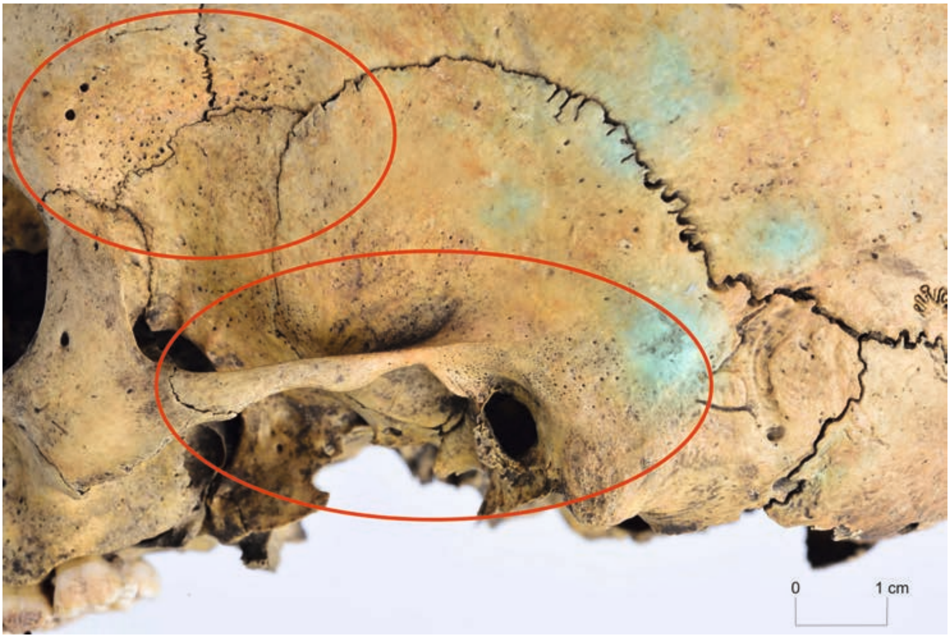

Fig. 7. Grave no. 17/17. Abnormal amount of porosity on the left sphenoid, temporal, frontal, and parietal bones. Photo by M. Jóźwikowska

Ryc. 7. Grób nr 17/17. Zmiany porotyczne na lewej kości klinowej, skroniowej, czołowej i ciemieniowej. Fot. M. Jóźwikowska

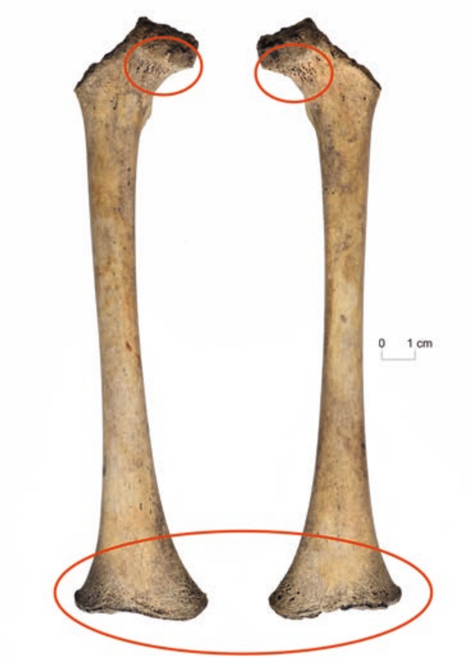

Fig. 8. Grave no. 17/17. Left and right femora exhibiting *cribra femora* on the antero-medial femora necks, distal porosity, and flaring. Photo by M. Jóźwikowska

Ryc. 8. Grób nr 17/17. Lewa i prawa kość udowa z widocznymi *cribra femora* na szyjce oraz zmianami porotycznymi przy końcu dalszym wykazującym poszerzenie. Fot. M. Jóźwikowska

Fig. 9. Grave no. 17/17. Posterior right femur proximal diaphysis periosteal lesion of new bone formation. Photo by I. Małęgowska

Ryc. 9. Grób nr 17/17. Zmiany zapalne okostnej z powstaniem nowej struktury kostnej na trzonie prawej kości udowej. Fot. I. Małęgowska

Fig. 10. Grave no. 17/17. Posterior left tibial mid-diaphysis periosteal lesion of new bone formation. Photo by I. Małęgowska

Ryc. 10. Grób nr 17/17. Zmiany zapalne okostnej, z powstaniem nowej struktury kostnej na trzonie lewej kości piszczelowej. Fot. I. Małęgowska

Differential Diagnosis

Several pathological conditions known to affect skeletal tissue in past societies were considered and evaluated against the lesions observed in the skeleton to narrow down the differential diagnosis for this child from Grave 17/17.

- Tuberculosis: a common and widespread lung infection caused by exposure to *Mycobacterium tuberculosis*. In advanced cases, it can create lesions on the thoracic vertebrae and ribs and may result in PNB formation in other parts of the skeleton [Lewis 2018; Buikstra 2019; Trajman et al. 2025].
- Treponemal disease (commonly known as syphilis): an infection of spiral-shaped bacteria (spirochetes), contracted through contact with contagious lesions. This disease can impact the skeleton by generating periosteal new bone formation, cortical thickening, caries sicca lesions on the skull, and saber shin deformities on the tibiae [Baker et al. 2020; Lewis 2018; Buikstra 2019].
- Hypertrophic osteoarthropathy: the abnormal increase of skin and bone associated with this condition often produces deformities of the distal long bones and digits, resulting in a clublike appearance [Martínez-Lavín 2020; Buikstra 2019; Aufderheide et al. 1998].
- Thalassemia: A genetic blood disorder that leads to chronic anaemia and bone marrow expansion that can cause cortical thickening in the skull and thinning of the long bones, making them susceptible to fractures [Lewis 2018; Martin, Thompson 2013; Buikstra 2019].
- Caffey's disease (infantile cortical hyperostosis): A rare inflammatory disorder during infancy associated with painful soft tissue swelling, thickening of the cortical bone and PNB, most commonly affecting the mandible, ribs, clavicle, scapula, and long bones [Gupta, Choudhary 2024; Buikstra 2019].
- Scurvy (vitamin C deficiency): A metabolic disease occurring from long-term vitamin C deficiency that impairs the synthesis of collagen and bone formation, leading to PNB formation on long bones, flaring of distal long bone metaphysis, and abnormal porosity manifesting on the bones of the skull [Lewis 2018; Buikstra 2019].
- Anaemia: A condition caused by a reduction in red blood cell production or hemoglobin levels. Some types of anaemia lead to marrow hyperplasia, resulting in skeletal changes such as cribra orbitalia, porotic hyperostosis, and ectocranial porosity [Lewis 2018; Buikstra 2019].
- Rickets (vitamin D deficiency): A metabolic disorder caused by long-term vitamin D deficiency, disrupting bone mineralisation, leading to stunted growth, bowed long bones (typically of the lower limb), fractures, and wide metaphyses [Lewis 2018; Buikstra 2019].

To advance a differential diagnosis, the lesions observed in the skeleton were compared directly to the diagnostic markers of each pathological condition. The comparison of Grave 17/17 lesions to each of these pathological conditions is listed in Table 1.

Table 1. Differential Diagnosis of Pathological Conditions. Prepared by L. Hayden
Tabela 1. Diagnostyka różnicowa zmian patologicznych. Oprac. L. Hayden

Condition	Diagnostic Skeletal Markers	Grave 17/17 lesions	Diagnostic
Tuberculosis	Lytic vertebral lesions	Absent	Not consistent with tuberculosis
Treponemal Disease	Caries, periosteal lesions on long bones & cranium	Absent	Not consistent with treponemal disease
Hypertrophic Osteoarthropathy	Distal long bone clubbing	Absent	Not consistent with condition
Thalassemia	Skull thickening	Absent	No evidence of Thalassemia
Caffey's Disease	Cortical thickening in mandible, ribs, clavicle	Absent	Not consistent with Caffey's Disease
Scurvy	PNB Flaring metaphyses Abnormal cranial porosity	Present Present Present	Lesions are consistent with Scurvy
Anemia	Porous lesions on orbit roof and ectocranium	Present	Lesions are consistent with anemia
Rickets	Long bone bowing Stunted growth	Absent Maybe present	Difference in age estimation could be consistent with rickets, but the lack of long bone bowing makes this diagnosis unlikely.

The presence, distribution, and pattern of skeletal lesions and porosity on the child in grave 17/17 are consistent with non-specific metabolic stress, which can result from nutritional or physiological stress. The differential diagnosis ruled out some common specific diseases recorded in the past and suggests the paleopathological profile of this individual is more consistent with systemic nutritional deficiencies, including scurvy and anaemia [Brickley et al. 2018; Krenz-Niedbała

2016; Lewis 2018; Buikstra 2019; Snoddy et al. 2018; Vlok et al. 2023]. While rickets is an unlikely diagnosis for the individual, a possible co-occurrence of rickets and scurvy in this individual cannot be ruled out, as this is a commonly documented condition in historical European subadults who have experienced chronic nutritional stress [Brickley et al. 2018; Schattmann et al. 2016]. The presence of cranial and postcranial lesions that include cribra orbitalia, periosteal reactions, and metaphyseal porosity is consistent with the classic presentations of these metabolic deficiencies [Lewis 2018; Buikstra 2019]. It is also impossible to rule out whether the child was affected by other non-specific infections, which could account for the presence of widespread porosity [Krenz-Niedbała 2009, 2016]. However, the lack of more severe periosteal reactions suggests that non-specific infection is an unlikely diagnosis.

Discussion and Conclusions

The difference in age estimates between dental (4.5 years +/- 12 months) and postcranial methods (~1 – 2.5 years) is typical for children in this region and may reflect population-level hardship in medieval Giecz [Agnew and Justus 2014]. These age discrepancies along with the observed lesions suggest the child from Grave 17/17 was experiencing chronic metabolic stress during their growth and development [Lewis 2018; Maresh 1970; Buikstra 2019; Scheuer et al. 2009]. Dental growth and development are strongly regulated by genetic factors, and nutritional stress is often associated with enamel defects and not with the eruption time of teeth [Goodman, Armelagos 1985; Hillson, Bond 1997; Lewis 2018]. In contrast, skeletal growth is more sensitive to physiological disruptions caused by malnutrition and disease [Hill, Gallant, Weaver 2019], and individuals are more prone to stunted height. Given the occurrence of dental enamel defects and the delayed maturation and growth of the postcranial skeleton of this individual when compared to dental eruption, it is likely that this child experienced an extended period of chronic metabolic stress, malnutrition, or illness that affected their skeletal development. This pattern is consistent with chronic metabolic stress, also documented in medieval European children from Poland, in Giecz (site 4) [Agnew, Justus 2014], Ostrów Lednicki [Krenz-Niedbała 2009, 2016] and Kałdus [Tuggle et al. 2021], as well as elsewhere in Europe (e.g., Douai, France) [Schattmann et al. 2016]. Given that co-occurring metabolic disorders were common across medieval Europe [Schattmann et al. 2016; Brickley et al. 2018], the child from Grave 17/17 likely suffered from extended exposure to nutritional and physiological stress, resulting in the pathological profile observed in the skeleton. The most likely conditions to have affected this child are scurvy and anaemia, but it is possible that other growth disruptions, like rickets, could have contributed to their stress. Since scurvy was previously identified as a probable diagnosis for a 5-6 year-old child from nearby site 4 in Giecz (fig. 2) [Agnew et al. 2008], there is already evidence for the presence of scurvy at this geographical location during a similar time period, lending further weight to the diagnosis.

To better understand the biological implications of this case study, it must be placed inside the cultural and environmental context of the 11th-12th century Piast Poland. This was an important period where Polish state formation and Christianisation reshaped society [Buko 2021; Manteuffel 1982]. The consolidation of power during the Piast dynasty and the slow, uneven spread of Christian burial practices [Urbańczyk 2024] introduced new social and economic systems, resulting in significant changes to local societies and subsistence systems. During this period, Radzyń Chełminski in Northern Poland experienced environmental instability, deforestation, and soil depletion [Brown et al. 2015]. Similarly, in Giecz, construction of the stronghold and increasing settlement size would have required forest clearing and wetland modification for increased agriculture [Celka et al. 2023], leading to a limited cereal-based diet for most of the population, specifically non-elite populations [Błaszczyk et al. 2021]. When compounded by local political and religious changes, these changes likely left populations more vulnerable to metabolic stress, and Grave 17/17 may be an example of such vulnerability during the period.

In conclusion, the Grave 17/17 child from Giecz displays skeletal patterns consistent with metabolic stress. A differential diagnosis excluded tuberculosis, Caffey's disease, hypertrophic arthropathy, and thalassemia and suggested that nutritional deficiencies caused scurvy, anaemia, and/or non-specific infections, which increased the stress burden on this individual during their life [Brickley et al. 2018; Krenz-Niedbała 2016; Lewis 2018; Buikstra 2019; Schattmann et al. 2016]. This case study provides a preliminary glimpse into childhood health during the early Piast period in Poland, but further research is needed on all other skeletons in the collection to characterise the life experiences of individuals and the population who lived through periods of significant change in Polish history.

Acknowledgements: Magda Miciak, Teresa Krysztofiak, Dr. Andrzej Kowalczyk and The Museum of the First Piasts at Lednica, Dr. Marek Polcyn and the Slavia Foundation

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Studium przypadku stresu metabolicznego u dzieci w Gieczu w XI-XII wieku w Polsce

Streszczenie

Celem opracowania jest analiza objawów stresu metabolicznego u dziecka pochowanego na wczesnośredniowiecznym cmentarzysku Gz10.

Stres metaboliczny w dzieciństwie jest częstym tematem badań bioarcheologicznych. Zjawisko to wiąże się z niedożywieniem, chorobami przewlekłymi i/lub stresem fizjologicznym. Oznacza to, że okres wzrostu i rozwoju jest szczególnie podatny na niestabilność środowiskową oraz społeczno-polityczną. Zmiany obserwowane na kościach pomagają zrozumieć, w jaki sposób dieta, choroby i warunki życia wpływały na szkielety osobników młodocianych, a także dostarczają informacji o tym, jak wczesnośredniowieczne społeczności adaptowały się do zmian ekologicznych, politycznych i religijnych.

Cmentarzysko Gz10 położone jest na obszarze ziemi uprawnej należącej do lokalnego rolnika, około 0,5 km na północny zachód od pozostałości grodu z okresu panowania pierwszych Piastów. Datowane jest na XI-XII w. Ze względu na postępujące niszczenie stanowiska od 2014 roku prowadzone są tam coroczne badania archeologiczne w okresie letnim. Do roku 2025 odkryto 238 grobów, w tym 115 (48,3%) dorosłych i 123 (51,7%) dzieci.

Pochówek dziecka (grób 17/17), stanowiący przedmiot niniejszego opracowania, odkryto w 2017 roku. Szczątki kostne nosiły ślady uszkodzeń spowodowanych działalnością rolniczą, jednak ogólny stan zachowania szkieletu oceniono jako dobry, a jego kompletność – na około 90%. W grobie znaleziono kilka paciorków oraz osiem kabłączków skroniowych, co może świadczyć o stosunkowo wysokim statusie społecznym zmarłego.

Wiek w chwili zgonu oszacowano z wykorzystaniem wielu metod, aby uwzględnić różnice w tempie wzrostu. Na podstawie rozwoju uzębienia określono go na około 4,5 roku (±1 rok), natomiast analiza długości kości długich wskazywała na wiek 2-3,5 roku. Łącznie przyjęto zakres 2-4,5 roku.

Obserwacje makroskopowe wykazały liczne zmiany patologiczne. W czaszce, na stropach obu oczodołów, zarejestrowano *cribra orbitalia*. Porowatości stwierdzono również na kościach szczęki i żuchwy, wokół otworu nosowego, na kości klinowej, czołowej, potylicznej oraz na kościach skroniowych i ciemieniowych. Na uzębieniu wystąpiła hipoplazja szkliwa (zarówno liniowa, jak i guzkowa). Zmiany porotyczne obserwowano również na szkielecie

postkranialnym – na kościach biodrowych i udowych. Ponadto na trzonie prawej kości udowej oraz lewej kości piszczelowej rozwinęło się zapalenie okostnej.

Zaobserwowane zmiany chorobowe u pochowanego dziecka są zgodne z obrazem nieswoistego stresu metabolicznego, który mógł wynikać ze stresu żywieniowego lub fizjologicznego. W diagnostyce różnicowej wykluczono m.in. gruźlicę, chorobę Caffeya, artropatię przerostową oraz talasemię. Profil paleopatologiczny tej osoby jest najbardziej zgodny z ogólnoustrojowymi niedoborami żywieniowymi, zwłaszcza ze szkorbutem i anemią. Krzywica została uznana za mało prawdopodobne rozpoznanie, choć nie można wykluczyć współwystępowania krzywicy i szkorbutu, co jest często odnotowywane u osobników młodocianych doświadczających przewlekłego stresu żywieniowego. Nie można również wykluczyć obecności innych, nieswoistych infekcji, które mogłyby tłumaczyć rozległe porowatości. Jednak brak bardziej nasilonych zmian zapalnych okostnej sugeruje, że infekcja nieswoista jest mało prawdopodobnym rozpoznaniem.

Analiza przypadku dziecka z grobu 17/17 stanowi wstępne źródło wiedzy o stanie zdrowia dzieci we wczesnym okresie piastowskim w Polsce. Konieczne są jednak dalsze badania wszystkich szkieletów z cmentarzyska, aby dokładniej scharakteryzować doświadczenia życiowe osób i populacji żyjących w tym regionie w okresie istotnych przemian historycznych.

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otrzymano (received): 19.10.2025; zrecenzowano (revised): 30.10.2025; zaakceptowano (accepted): 13.11.2025

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