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Biomedical Perspective: Critical Assessment of an Outdated Concept

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ABSTRACT

The concept of biomedicine goes back to Robert Koch's theory of disease being caused by pathogens or other factors and rests on the premise of a simple cause-effect relationship between measurable pathophysiological triggers and disease phenomena. The biomedical perspective determines health care and clinical practice worldwide but exhibits obvious limitations in the case of non-communicable and mental diseases. Moreover, it ignores the social determination of health and disease and thus essential findings of health sciences research. At the same time, the dominance of the biomedical perspective is growing worldwide, not least due to the handling of epidemics and pandemics and the expansion of genetic and novel molecular biological methods.

KEYWORDS: Disease-health dichotomy; Risk factors; Biological mechanisms of disease; Social determination of health; Biomedical reductionism

INTRODUCTION

Life sciences are the foundation of current medical practice and education. They deal with the dispositions, structures and functions at all levels of the organism. The biomedical approach pursues the goal of systematically providing causal explanations based on scientific criteria. Today, the biomedically determined view of disease, risk and health represents the dominant explanatory pattern of medicine in theory and practice. It determines both the thought and decision-making processes in health care and health policy worldwide as well as the basic understanding and behavioural expectations with regards to health and disease. In most societies, medical diagnoses are legitimacy instruments for social, insurance and labour law agreements and therefore require, among other things, the clearest possible distinction between health and illness.

Biomedicine is primarily concerned with research and less with clinical procedures in human medicine. The focus is on combining the contents and questions of experimental medicine with the findings and methods of the molecular and cellular biological foundations of human life or their pathological changes. Biomedicine pursues the goal of making molecular research of disease mechanisms usable for the technical and medical development of highly specialised therapeutic procedures.

The Biomedical Perspective of Disease and Health

The biomedical perspective implies a disease model with a simple cause-effect relationship, which in turn is based on measurable physical causes of cell or tissue damage or dysregulation of metabolic processes Sarto-Jackson [1]. Biomedicine is based on pathophysiological findings and assessments and is fundamentally disease rather than health related. Diseases are considered to be disturbances of vital processes in organs or in the organism as a whole. They have specific contexts of origin (aetiologies), typical symptoms and manifestations (clinics), offer objectively describable possibilities of influence (therapies) and produce functional consequences (prognoses).

Understanding these factors allows for predictable treatment results (therapies, curation) in addition to creating conditions that are conducive to the derivation of healing and recovery processes (chronification, relapse, disability). The biomedical perspective allows for the determination of typical disease-specific and as far

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as possible-causal anatomical, organic, biochemical, physiological, neurobiological and/or other scientifically objectifiable triggers, causes or deviations from biological or functional control variables. The causes of disease relevant to the biomedical perspective can be divided into four complexes:

a) Infections triggered by transmissible microorganisms,

b) Endogenous biochemical dysfunctions of the body, its organs and physical cycles (including metabolic disorders and autoimmune diseases),

c) Organ defects and dysfunctions in the organism caused by exogenous influences such as noxious substances, fire, physical objects, accidents or (risky) behaviours,

d) Malfunctions due to genetic predispositions and susceptibilities.

The Historical Relevance of Biomedicine

The biomedical perspective defines health as the absence of disease and of biological dysfunctions, homeostatic disturbances or negative influences, and as the subjective perception of a "silent" and trouble-free functioning of the organs. In this view, disease and health present themselves as dichotomous states in an organic-functional equilibrium considered "natural". In contrast to the salutogenic model (salutogenesis) of a health-disease continuum, biomedicine does not adequately include the processual, biographical and social connection between health and disease.

The guiding concepts are largely based on the extended bacteriological "Koch model" developed during the last quarter of the 19th century. The current biomedical disease model rests on the "germ theory" or "cellular pathology" of the time. According to this model, various factors interact in the development of infectious diseases: a pathogen with a certain virulence (agent), a carrier of the pathogen (vector), a person with insufficient immunity to the pathogen (host) and environmental conditions conducive to infection (environment). A person falls ill with an infectious disease such as tuberculosis, hepatitis or AIDS when all variables come together at the same time and in the same place.

Natural science medicine provides a plausible and historically successful framework model for treating and preventing infectious or communicable diseases and has made an important contribution to the significant increase in global life expectancy. Hence, the disease model, named after the German social physician Robert Koch (1843 to 1910), whereby disease is believed to be triggered by pathogens or other identifiable causes, is still suitable for diagnosis and therapy today. Likewise, biomedical diagnoses and therapies are useful for a variety of medical and surgical problems, such as gastric or duodenal ulcers, coronary artery disease, type 1 diabetes mellitus, a broken bone, burns or other injuries. The prerequisite for the classification as a disease and the initiation of causal treatments are always scientifically verifiable structural changes and/or functional disorders in the organism.

The Limits of the Biomedical Perspective

Although communicable diseases still largely dominate the burden of disease in low-income countries of the Global South, they only account for a smaller share of the total global disease burden. In emerging economies, their relevance has been noticeably declining, while in high-income countries they contribute only to a minor extent to morbidity and mortality GBD [2]; the SARS-CoV-2 pandemic will not change this general trend. In this context, it has to be pointed out that the biomedical perspective is only of limited use for chronic degenerative diseases and their multifactorial causes, therapies and prevention that are prevalent worldwide today; the same applies to functional or somatoform mental disorders. The one-sided bioscientific, ultimately monocausal orientation, can only capture or adequately describe a small part of disease causes and predictors Sarto-Jackson [1].

Adequate descriptions of diseases and causes of death, regardless of whether they are attributable to microorganisms, accidents, environmental and behavioural conditions, require the consideration of cultural, political, economic, systemic-organisational and societal conditions, as well as an understanding of social action and the shaping of lifestyles. Last but not least, biochemical causal chains, organic defects or genetic causes or "markers" cannot be sufficiently verified for numerous physical diseases and dysfunctions (e.g. for the psychosomatic problems, mental health disorders and the interactions of overlapping health conditions in the context of age-related multimorbidity). In psychiatry and similar clinical areas, fundamental doubts about the validity and usefulness of the biomedical paradigm are therefore appropriate Deacon [3].

In addition, numerous findings from epidemiology, and particularly from social epidemiology, as well as stress research point to the importance of the multidimensional social determination of health and illness Germov [4]. These can be either risk factors for physiological processes and the immune status, or resources which have the potential to protect from health disorders and promote their successful management according to scientific evidence.

New Trends in Biomedicine

Telomeres, a kind of protective caps at the ends of the cell chromosomes, have increasingly become the focus of scientific research as the biomedical, morphological substrate of the social determination of health. The telomere length decreases slightly with each division, and if telomeres fall below a certain length, the protection of the genes is compromised and no longer guaranteed. As a result, the cell is increasingly unable to fulfil its functions, and subsequently cell division and renewal cease. The influence of socioeconomic living conditions on the development of telomere length Powell-Wiley et al. [5], which can already be proven in childhood and adolescence Alexeeff et al. [6], has been widely documented in the meantime: the less favourable the living conditions are, the faster the telomeres lose their length and the faster the cells age.

The classical biomedical perspective underwent further development between 1960 and 1990 with the preventive medicine model of risk factors, which identifies "predictors" for the most important chronic and degenerative diseases such as coronary artery disease, malignomas, diabetes and rheumatism, as well as HIV/Aids, according to epidemiological observations and findings. Large population studies point to several factors that increase the likelihood of both communicable and non-communicable diseases. Unprotected sex, for example, is clearly a risk factor for HIV infection and other sexually transmitted infections (STIs). Physical inactivity, malnutrition, smoking and insufficiently compensated or compensable stress are considered risk factors for coronary artery disease. In addition, behavioural and organic problems such as high blood pressure or elevated blood fat levels, manifest themselves in

diseases like diabetes mellitus or renal insufficiency, and symptom complexes such as metabolic syndrome are known risk factors for certain pathologies and can act either alone, in interaction with others or with mutual reinforcement. Thus, the risk factor model represents a further development and not a contradiction to the biomedical perspective. Including the risk factor model in the biomedical perspective provided the essential foundations for early health education, health information and medical health counselling as well as for the more recent common behavioural prevention and prevention policies.

Biomedically Driven Future Perspectives

The current dominance of the biomedical perspective is reflected in the extensive investments in dynamically developing cell biology, genome research and genetics as well as molecular medicine and nanotechnology Pattini et al. [7]. The so-called omics sciences, i.e. molecular biological methods such as genomics, transcriptomics, proteomics, metabolomics, secretomics ending in "omic", have attracted increasing attention in recent decades and have likewise become the focus of (natural) scientific research Leopoldina [8]. They promise "individualised" or "personalised" medicine and prevention that will soon be available in the following five areas:

a) Formation of subgroups of individuals based on disease-associated biomarkers.

b) Genome-based information on health-related characteristics (by means of so-called "DNA arrays").

c) Identification of individual health risks.

d) Differential early detection and (early) intervention at molecular or biochemical level.

e) Development of unique therapeutic products ("tailor-made" pharmacotherapies).

Access to health, as well as exposure to disease and disease risks, is increasingly determined by knowledge of genetic conditions and personal cell-biological dispositions. This applies not only to the individual level, but also to social perception and discussion. The tendency towards medicalisation of all areas of life is increasingly appearing in the form of "geneticisation" (predictive medicine and individualised medicine).

According to critics, molecular medicine is the gateway for "anthropo-techniques" in medicine and society: "Human bioengineering" positions medical and bioscientific knowledge in the service of human performance enhancement and the transgression of natural limits. This influences the images of man and the professional view of health and illness, and at the same time the distribution of resources in health research, the catalogue of services and admissions of statutory health insurance and public health care, informational self-determination and data protection - and last but not least the definition and design of primary or predictive prevention in a way that is not yet fully foreseeable.

Health promotion, primary prevention and public health sciences do not fundamentally contradict pathogenetic concepts and the biomedical perspective, but rather integrate them into a health-scientific, i.e. bio-psycho-social, interdisciplinary and intersectoral way of thinking and acting. The more holistically an intervention is planned and implemented, the higher the health benefit. In contrast to traditional health education, however, promising health-promoting interventions no longer aim to only "eliminate" epidemiologically identified risk behaviours and risk factors in individuals or groups of people. Rather, the goal is to create and maintain the conditions for health-promoting lifestyles and ways of living through promoting competence, strengthening self-help skills, better networking and capacity building.

Biomedical Reductionism

In the biomedical core understanding, the social determination of health, disease and risk behaviour in life worlds and real life remains largely ignored. The social, economic, political and climatic conditions play at best a subordinate role in the common analysis of causes of disease or political measures; this applies to clinical theory and practice, to health care and health system design, and especially to health policy. All these fields exhibit an under-complex narrowing of the biomedical perspective. The widespread trend towards biomedical reductionism became particularly evident during the SARS-CoV-2 pandemic in the early 2020s. Quite soon after the outbreak, empirical evidence revealed that socio-economic and socio-demographic factors have an impact on the likelihood of severe COVID-19 infections and COVID-19-associated deaths. Although poverty, low education, cramped living conditions, ethnic affiliation and chronic pre-existing conditions that generally occur more frequently in disadvantaged socioeconomic strata have to be considered relevant risk factors, little was done to focus the anti-corona measures on these groups.

For a long time, the politically predetermined restriction resulting from the biomedical perception of the pandemic, embodied by the omnipresence of virologists and biomedicine-driven epidemiologists, obscured the view of socially determined risk factors and particularly endangered population groups. The dominance of the biomedical perspective was also evident in the controversies about vaccination quotas and compulsory vaccination during the pandemic. In times of crisis, a large share of the population apparently believes and trusts in technological solutions. The belief in successfully advertised vaccines is not even put off by inconsistencies such as incomplete protection against infections and severe disease or short protection periods. The dominance of the biomedical perspective creates a false sense of security and obscures the view that the currently available vaccinations are insufficient to overcome the pandemic and that complementary social and political measures are needed.

The relatively new field of global health is also heavily influenced by a biomedical perspective. Unlike international health, which evolved from colonial tropical medicine and primarily pursues developmental approaches focusing on the prevention and treatment of communicable diseases, global health is a complex and multidisciplinary discipline that goes far beyond disease control and prevention. Global health approaches require addressing a multitude of cultural, societal, political, economic, environmental and other factors that have a significant impact on human health Holst [9]. Nevertheless, the shortcomings of the biomedical perspective in global health were dramatically demonstrated during the SARS-CoV-2 pandemic, where non-biomedical health science aspects were widely ignored Holst [10].

CONCLUSION

The dominant focus on biomedical solutions ultimately becomes a risk to people's health. A truncated, predominantly biotechnological understanding of public health does not explain

the social determination of health and the root causes of the existing unequal distribution of health. Instead, it leads to an underestimation of relevant non-medical factors. Biomedical reductionism tends to marginalise the political, economic, societal and environmental risks, which contribute significantly to the health and disease burden of populations. As a result, prevailing health policies and strategies often underestimate the complexity of public and global health and thereby challenge the universal right to health (Holst 2020a). Reducing health and illness to biological factors tends to promote the medicalisation of social problems and individual lifestyles. Models that primarily take into account organic-pathophysiological causes of chronic-degenerative diseases only provide limited approaches for prevention and health counselling. Even in medical secondary and tertiary prevention, potentially promising behavioural changes through patient counselling and patient education fall short, as long as they do not sufficiently take into account environmental prevention.

REFERENCES

1. Sarto-Jackson I (2018) Time for a Change: Topical Amendments to the Medical Model of Disease. Biological Theory 13(1): 29-38.
2. GBD 2019 Diseases and Injuries Collaborators (2020) Global burden of 369 diseases and injuries, 1990-2019: a systematic analysis for the Global Burden of Disease Study 2019. Lancet 396(10258): 1204-1222.
3. Deacon BJ (2013) The biomedical model of mental disorder: a critical analysis of its validity, utility, and effects on psychotherapy research. Clin Psych Rev 33(7): 846-861.
4. Germov J (2013) Imagining health problems as social issues. In: Germov, J (ed.) Second Opinion - An introduction to health sociology. 5th edition, Oxford University Press, Melbourne, Australia.
5. Powell-Wiley T, Gebreab S, Claudel S, Ayers C, Andrews M (2020) The relationship between neighbourhood socioeconomic deprivation and telomere length: The 1999-2002 National Health and Nutrition Examination Survey. SSM-Population Health 10: 100517.
6. Alexeeff S, Schaefer C, Kvale M, Shan J, Blackburn E, et al. (2019) Telomere length and socioeconomic status at neighbourhood and individual levels among 80,000 adults in the Genetic Epidemiology Research on Adult Health and Aging cohort. Environ Epidemiol 3(3): e049.
7. Pattini L, Bertacco R, Candiani G, Masseroli M, Servi S (2011) Trends in biomedical engineering: focus on Genomics and Proteomics. J Appl Biomater Biomech 9(2): 98-108.
8. Leopoldina (2015) Report on Tomorrow's Science: Life sciences in transition – Challenges of omics technologies for Germany's infrastructures in research and teaching. Halle: Deutsche Akademie der Naturforscher Leopoldina e.V. Nationale Akademie der Wissenschaften.
9. Holst J (2020a) Global Health-Emergence, technocratic narrowing and hegemonic trends of a new concept. Globalization Health 16(1): 42.
10. Holst J (2020b) The world expects effective global health interventions: Can global health deliver? Global Public Health 15(9): 1396-1403.