Perspectives Towards Molecular Sociology: An Approximation of Molecular Biology and Sociology

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Abstract

Molecular sociology is used in our study to describe how behaviours of humans and/or animals can be explained. Yet, behaviours are still complex phenomena that cannot be placed in one frame. From the accumulative evidences from my previous studies and others, it is plausible to claim having fundamentals of molecular sociology. It has been demonstrated that diabetes is associated with the expression of iNOS in white matter in brains of diabetic rats compared with grey matter. These changes were significantly observed between diabetic rats and normal rats (P < 0.001). We have also found that the expression level of HSP70 has also been reduced in white matter significantly among study groups (P < 0.05). Starting from these findings, it has been possible to suggest or figure out a potential mechanism to explain diabetic neuropathy. It is also possible to associate diabetic behaviours which are characterized by being nervous and stressful. We have also demonstrated that exposure to heavy metals, particularly lead (pb) has impacts on prisoners compared with normal population. In the first study, we have demonstrated that exposure to lead reduced blood cellular components significantly compared with normal population (P < 0.05). Such blood findings may denote to intolerance and less patience that may lead to aggressiveness and violent behaviours. The same prisoners who had higher levels of lead (pb) were more likely to have violent crimes. Our findings have also demonstrated the association between lead exposure and mental retardation in a sample treated in one of rehabilitation centres. This study has demonstrated that the patients who were diagnosed with mental retardation due to inheritance to have high concentration of lead. Regarding addiction, our results revealed strong association between depression and addiction. Our results also indicated that addictive patients had low vitamin D. Other studies have indicated that some pathogens such as Toxoplasma gondii to be associated with violence and aggressiveness.
Taken together, the previous conditions clearly identified the bases for molecular sociology to understand deeply the human behaviours and to adopt strategies that attenuate the effect of environment on human actions.

**Introduction**

The current study reviews sociology based on molecular level. Although, we think that human behaviours cannot be restricted within any frame, we have attempted to change the angle of vision and to view this topic differently.

According to Berry\(^1\), two approaches are available: the bio-medical approach and systems biology. Bio-medical approach implies that dynamic human behaviour (internal factors) to be considered for chronic disease management. However, the dimensions of the Bio-psycho-social (BPS) model of Engel which involve the addition of patients’ background and cultural beliefs (external factors) contributing to their susceptibility to, and coping strategies for, non-communicable diseases (NCDs).

It has been pointed to a challenge in which social factors associated with disease may be placed into an integrated model of care, especially in the management of chronic disease. The solution was proposed to be as to propose that “sociotype” as a framework to demonstrate the interactions between the social, cultural and environmental inputs that affect the growth, development and life-long behaviour of a person, including relationships, lifestyle and coping strategies.

Pre-/peri-natal effects on the induction of chronic diseases in terms of initiation and associated susceptibility to chronic disease are considered as examples of interactions between the sociotype, genotype and phenotype. It has been shown that sociotype diseases, including social determinants (e.g. poverty, education, networking), of disease are major contributors to the increase in NCDs, as well as for mental illness and absenteeism. Thus, people are the product of a threefold cord – genotype, phenotype and sociotype\(^1\).

**Diabetes and molecular sociology**

Diabetes mellitus is not considered as a single disease, but rather it is a group of metabolic diseases which leads to progressive damage of organs\(^2\). The most affected organs by diabetes are the kidney, retina, peripheral nervous system (PNS), and small and large blood vessels\(^3\).

Lowered blood glucose concentrations shift the case of patients from cognitive impairment to convulsion, coma, and eventually death. Furthermore, moderate levels of hypoglycemia impair general cognitive abilities, including reaction time, analytical ability, verbal fluency, and verbal and visual memory\(^4\). A new study by Calum et al\(^21\) confirmed that diabetes and depression are associated with each other and shared similar biology.

Our studies in diabetes using rat as an animal model have shown several findings on molecular level. We have demonstrated the existence of significant association of the expression of inducible nitric oxide synthase (iNOS) between control group and diabetic groups (p=0.000). Furthermore, our data showed the increased expression of iNOS in brains of diabetic rats more concentrated in white matter compared with control group\(^5\). In other studies using the same model, we have also demonstrated a significant expression of iNOS in several tissues of diabetic rats including kidney and heart\(^6,7\). Taken together, diabetes is a disease
associated with stress in various organs. According to this context, it is plausible to think about molecular effects of certain biomarkers including iNOS to interfere with behaviors of diabetic persons.

**Impacts of environment on behaviours**

We have conducted several studies to target the impact of environment on human. In the first study, we explored a possible relationship between lead exposure and mental retardation. Comparing mentally retarded patients with control group showed that more blood Pb concentrations were associated with mental retardation and physical impairment.

In another study we investigated the possibility of impact of environmental exposure to lead (Pb) and violent behaviours among prisoners at two Jordanian hospitals. Lead is accumulated in the body and its impacts last for a long time. Several studies have associated crime rates with lead exposure. Study objectives were to investigate lead levels among prisoners in two selected prisons in the Northern of Jordan and to investigate any possible correlation between lead levels and crime related variables. Study findings showed that prisoners had a higher blood lead level (0.924+1.79 μg/dl) compared with control group (0.570 +0.560 μg/dl). No significant variation was observed between two study groups (P 0.480). The results revealed positive association between crowded traffic and lead exposure among prisoners (P 0.038). Taken together, although the study findings showed no significant association between blood lead concentration between prisoners and reference participants, it is observed that prisoners have about double concentration of blood lead and it is highly possible that our findings supported the environmental hypothesis which explained the effects of removal of lead from gasoline in lowering crime rates in US.

We have also conducted further studies to explore the impact of occupation on worker’s health. Our studies revealed that heavy metals were more concentrated in worker’s biological fluids such as blood, and urine. Our research team found that workers in jewellery manufacturing are significantly exposed to nickel, cadmium and copper compared with reference groups (P=0.000). In industrial settings, welders have been found to be significantly exposed to chromium compared with control group (P=0.000). Another study targeted the occupational exposure of chromium and cobalt among dental technicians. Compared with medical technicians, study results showed significant exposure of dental technicians to both chromium and cobalt (p=0.000). In another study, we demonstrated that workers at aluminium sector had significant exposure to aluminium compared with reference groups (p=0.000).

Taken together, being exposed to heavy metals either from environment or occupational settings impacts neuronal system and interferes with behaviour and by thus molecular sociology covers these aspects.

**Depression and vitamin D**

Depression may due to vitamin D as we show in a recent review article. In another study, we showed that addicted people were depressed persons. The link between depression, addiction and vitamin D deficiency is obvious. Once again, social phenomena have molecular origin.

**Herbal experience of public**

As environment gives heavy metals and impacts our biological systems, it has also beneficial effects. Medicinal herbs are commonly used by people to treat many diseases. Our studies showed that medicinal herbs including *Urticapilulifera*
off prophyphylactic and therapeutic benefits for patients on cellular level on various organs such as liver and kidney through downregulation the expression of iNOS and upregulation of stress proteins17-19.

Conclusions

The present study suggested the need to establish molecular sociology as a new science which links sociology and molecular biomedicine. Although human behavior is a complex phenomenon, understanding of brain chemistry on molecular level helps understanding of human actions and reactions and can provide good tools to control these behaviours.

References


