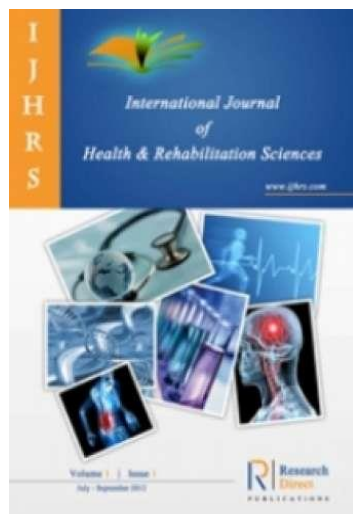


Case Study



Bio-psycho-sociocultural basis of diabetes rehabilitation: case report with implications for cultural competence and physiotherapy

Ezekiel Uba Nwose, Phillip Taderera Bwititi

ABSTRACT

Background: During a neurophysiology lecture in a physiotherapy class, a philosophical statement “*psychologist is a physiotherapist who specializes in physiological manipulation of the limbic system*” was presented to students for reflection and the first response was “*physiotherapy is not psychology*”

Objectives: The aim of this case report is to contribute to the evolving discussion regarding cultural competence and how psychological tool of ‘listening’ may be physiotherapeutic in diabetes rehabilitation

Materials and methods: A case of new diabetes emergency is presented: client was unresponsive to drug and anxious to change medication as well as the staple meal. Intervention involved listening to the client, which led to (1) identification of psycho-sociocultural stress as potential cause, and (2) successful further intervention by removing the feeling of pressures.

Results: An important outcome that blood glucose level was non-responsive to drug got stabilised, client went back to work in the following week and remained stable during the one month follow-up.

Conclusion: Theory is formulated – albeit a re-articulation of known idea that the limbic system is linked up to the hypothalamus-pituitary-adrenalin axis is in part possibly the basis of diabetes and unresponsiveness to drug. Overall, this article identifies that empathic listening is more than just a necessary communication skill, but also a physiotherapeutic regimen that involves manipulating the limbic system to stop release of e.g. glucocorticoids. On the corollary, not listening to a client is not only poor communication skill, but also a cause of pathophysiology that can cause disease and/or exacerbate existing diabetes.

Keywords: diabetes management, cultural competence, empathy, listening skills, physiotherapy, psycho-social stress

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INTRODUCTION

Cultural competence in care giving refers to attitudes and behaviours of the carers¹, and it can also be defined as the level of correctness of translation of knowledge about individuals or groups of people into specific standards, which determines quality of service such as healthcare¹⁻³. Cultural competence is an issue that has evolved and it is acknowledged to be as yet contextual³. In the context of diabetes healthcare management, this includes consideration of sociocultural beliefs and lifestyle, especially nutritional as well as occupational practices.

A lot is known regarding stress-induced hyperglycaemia and the need for holistic care⁴⁻⁸. This includes the fact that diabetes and mental disorders are closely associated and both influence each other in complex physiologies⁹. Yet, assessment criteria and management strategies of diabetes emergency department seems articulated¹⁰, but without recourse to physiotherapy. Further, the need to develop preventive interventions has been identified¹¹, but the development is yet *in lieu*. However, knowledge of how to develop the preventive interventions are suggested to be based on education to promote healthy interactions in families^{12,13}, and incorporation of innovative mental health services strategies including resilience framework and community collaboration¹⁴.

A critical review of the suggestions reveals two key themes – communication skills and emotion, which are fundamental psychiatry and psychology. Although, what is missing in the suggestions is involvement of physiotherapist, it is known that the psychiatric history incorporates not only the psychiatrist's evaluation but those of other disciplines such as physiotherapy¹⁵. There is probably a role for physiotherapists in assessment and management of diabetes¹⁶⁻¹⁸, but such a role is not clear in hospital emergency. Physiotherapists are involved in mental health and neuroscience and this includes mental

healthcare by physical therapy;¹⁹ and evaluation and treatment of injury of the nervous system,²⁰ among others.

Method – Case presentation

Preamble

Here is a case of 49 years old African male 'undiagnosed' possibly post-traumatic stress disorder (PTSD) client. Prior to the diabetes scenario, the client has been uncomfortably the sole income earner for his family of eight plus mother-in-law. He suffered loss of investments and in 2015 had the emotional trauma that he described as "lost my precious son to cold hand of death". He had also been diagnosed with diabetes and hypertension, which were not responding to medication.

Client's narrative

First day: The client had been sick for the past 3 weeks with malaria typhoid and his BP was 170/110 mmHg and blood sugar was 189 mg/%, but the client thought that with the help of God he was okay. He reported further that he was on drugs to control the BP and the blood sugar has come down to 140 mg/%. To worsen the situation government had not payed his salaries.

Two days later: Much as he appreciated counselling and advice, he still expressed need of financial support at this critical moment. He reported that the previous night, he urinated ten times and in the morning, he was waving. He went to the hospital lab and behold the sugar level was 202 mg/%. He believed the reason could be that he had been eating eba (cassava) for the past weeks since he had no money to buy wheat option and to change his drugs.

Intervention

On first day: The client was counselled based on his illness and what he was going through and this counselling involved the wife and grown up children.

On the second: Further family counselling was done and it was explained that switching from cassava to wheat meal is not a magic wand that will alleviate his illness. In particular:

- Client was led to understand the need to (1) avoid loneliness, except for relaxation; (2) go to his farm as a form of exercise and occupational therapy as opposed to obligation to alleviate financial pressures; and (3) identify accessible or affordable foods that are of medicinal value.
- Wife was made to understand the impact of pressure and stress including how she can relieve some of the pressures and stresses. Empathy was purposely induced by asking her to imagine what she will do to survive as a single parent, if the husband were to pass away.

Result – Outcome

The client felt that although the financial need had not been solved, the feeling of pressures had been removed and that created the aura of relaxation and this was mainly from the new level of interaction within the family. The client was also advised to consume bitter leaf (*Vernonia amygdalina*), a traditional vegetable with antidiabetic properties²¹⁻²³, which is available and most often free. Plantain, a traditional food with antidiabetic properties^{24,25}, was also identified as accessible and acceptable for the purpose of dietary changes. The client returned to work the following week and the blood glucose level is now stable and under control. The evidence to substantiate that this case study approach worked is that client has remained stable and has neither presented another crisis nor taken sick leave from work.

Reflecting on the case: It is important to note the client's anxiety. First, he had not been paid salary. The second thing to be mindful of was the client's desire to change drugs, apparently because the drugs were not working and thirdly the client wanted to change his meal from cassava to wheat.

Unknown to the client, studies indicate that glycaemic index of cassava and wheat meals are close. Therefore, there is no guarantee that the wheat option is the magic wand, because glycaemic index of the cassava meal may be

lower depending on how it is processed or consumed^{26,27}, but the client was anxious to change diet. Further, neither the client, nor family members were aware that client's past and continuing stressing out could have caused the disease and may be the reason of being unresponsive to drug.

Discussion

Pathophysiological basis of psychosociocultural pressure complicating of diabetes

This case report builds on the knowledge that health outcomes of diabetes management depends on a client's bio-psycho-sociocultural characteristics as well as the carer's content of care²⁸. PTSD can cause diabetes and cardiovascular accidents^{29,30} and psychological problems such as depression are common in diabetes and this has been reported to have strong links with poor metabolic control and diabetic complication. Although screening tools are established there are problems with identifying patients with depression but when such individuals are referred for treatment, the outcomes have been successful³¹. In terms of physiology, the mechanism of stress regulation by the limbic system has been articulated³². Suffice to note that the physiological functions of the limbic system, which comprises amygdala and hippocampus, include the probability of both activating and inhibiting the hypothalamus-pituitary-adrenalin axis (HPAA). The hippocampus inhibits, the amygdala activates the HPAA and the degree of activation of glucocorticoid secretion by the amygdala is potentially proportional to the amygdala's response to stressors such as social interactions³². Thus, stressors cause the amygdala to activate the HPAA *en route* to hyperglycaemia.

Thus, in the context of novel application of known idea, what is being highlighted here is a translation on how PTSD or persistent emotional stress can be effectively determined as a cause of pathophysiology in diabetes

emergency. In the case presented, it is imaginable that

1. The client has been under financial stress
2. The memories of lost investments and precious son constituted episodes of psychological trauma
3. Episode of financial stress and unmet family or psycho-sociocultural pressure constitutes a PTSD episode.

In the case presented, the PTSD arising from psycho-sociocultural pressure may have been unaccounted for, and gone undiagnosed clinically, but the pain-response of the limbic system perhaps activated the glucocorticoids' release, which is exacerbate hyperglycemia thereby disrupt the otherwise managed physiology and thus make diabetes to manifest.

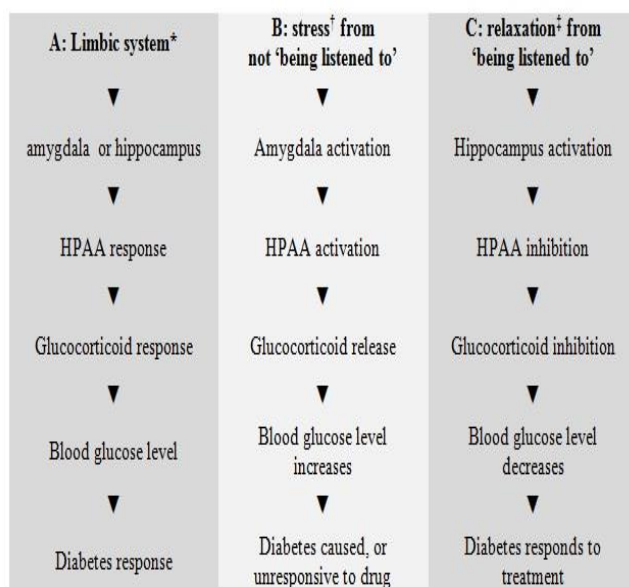
Basis for cultural competence and physiotherapy in diabetes rehabilitation

Communication is acknowledged as key in physiotherapy professional practice and it is recommended that physiotherapy pre-licensure as well as continuing professional development include opportunities to develop listening skills.³³ apparently, requirements for licensure include cultural competence.³⁴

This case report also builds on the knowledge that physiatrist history is the integration of the physiatrist's evaluation as well as those of other disciplines such as occupational and physiotherapists¹⁵. At this juncture, it is probably pertinent to acknowledge that physiotherapy is inseparable or overlapping with psychology, especially by considering target of health benefits of regular exercise in the goals of physiotherapist and psychologist³⁵. In physiotherapy, exercise reduces anxiety, depression and negative mood. It is a therapeutic regimen that improves cognitive function and quality of life³⁴. Psychology uses structured exercise program to improve mood and promote wellbeing as well as promote self-management of mental and physical health issues^{36,37}. Therefore, there is no disputing that PTSD as well as diabetes emergency is within

the scope of physiotherapy. Indeed, physiotherapy involving massage has long been advanced in the context of massage therapy for children with various medical conditions including diabetes and this has been shown to reduce anxiety and stress hormone levels as well as improve clinical course³⁸.

The theory added here is that empathic listening by a physiotherapist is more than just cultural competence for hearing a client's story to enable effective diagnosis. Rather, it is also physiotherapeutic regimen as vignettted in figure 1. With reference to the case presented, it is noteworthy that client lives with the past trauma of lost child and investments as well as ongoing anxiety of financial pressure. PTSD was not previously diagnosed, probably because African men are least likely to show symptoms³⁹, or due to barriers in seeking clinical help⁴⁰. Nevertheless, the client had been diagnosed with diabetes and drug plus nutritional prescriptions made without recourse to untold story of PTSD. Perhaps, attending the clinic in emergency situations would have made evaluation for mental health a secondary priority, but not during efforts to stabilize blood glucose level with trials of different drugs or staple food and laboratory monitoring. This is the time for allied healthcare professional to come in and consider other options such complementary medicine and ethnopharmacology.



*The centre for emotion
[†]Anger, anxiety and/or depression
[‡]Joy and calming effects
 HPAA: hypothalamus-pituitary-adrenalin axis

Figure 1: Illustration of how stress can cause diabetes and mar treatment

With reference to the case presented, it is highly unlikely to identify, without empathy and good listening skills, pain and/or PTSD *vis-a-vis* emotion as the cause of diabetes or non-responsiveness to drug. Yet, the therapy that the client needed was probably only empathic listening that perhaps:

1. Manipulate the limbic system, which in turn will stop triggering the release of glucocorticoids that are making the diabetes to 'play up'. Then, instead of amygdala activating glucocorticoid release, the hippocampus will inhibit the release (Fig. 1).
2. Identify the untold story of PTSD, which will then inform the need for psychological treatment that may include diversional therapy and family counselling.

Nutrition in diabetes management

While the emphasis in the case report is on cultural competence, empathic listening and physiotherapy, it is worth mentioning that

virtually every disease entity is aggravated by life stresses⁴¹, and that good relaxation as well as anti-oxidant nutrients are relieving. Indeed, so much is known about the anti-diabetic effects of antioxidants and relaxation^{29,41-44}. It is therefore worthy to mention that the physiotherapist's knowledge of traditional food of the client is pertinent to successful 'patient education' *per se*. Discussion of nutrition or ethnopharmacology is out of scope of this case report but it is important to note that cultural competence goes beyond communication skills and includes knowledge of a client's cultural lifestyle as well as psycho-sociocultural values.

Conclusion

This article propagates on one hand that listening is more than a communication skill, but also a physiotherapeutic regimen that manipulates the limbic system physiology to stop triggering the release of glucocorticoids. On the other hand, not listening to a client is more than a poor communication skill, but also a cause of pathophysiology that could cause disease and/or exacerbate existing diabetes.

Conflict of Interest Notification

The authors declare that there is no conflict or financial interest to declare

References

1. The Royal Australasian College of Physicians. An Introduction to Cultural Competency. 2004; <https://www.racp.edu.au/index.cfm?objectid=FCB B0411-9DFF-0474-A0B250ACA0737BF8> (accessed 6th May 2015).
2. Donato R, Segal L. Does Australia have the appropriate health reform agenda to close the gap in Indigenous health? *Australian health review : a publication of the*
3. *Australian Hospital Association* 2013; 37(2): 232-8.
4. Universities Australia. The National Best Practice in Indigenous Cultural Competence in Australian Universities. 2011; <http://www.indigenousculturalcompetency.edu.au/html/Intro.html> (accessed 6th May 2015);
5. Nesbitt WR. Pitfalls in emergency care. *The Journal of family practice* 1976; 2(5): 333-7.
6. Pane GA, Epstein FB. Glucose. *Emerg Med Clin North Am* 1986; 4(1): 193-205.
7. Savage MW, Mah PM, Weetman AP, Newell-Price J. Endocrine emergencies. *Postgraduate Med J* 2004; 80(947): 506-15.
8. Wangel AM, Molin J, Ostman M, Jernstrom H. Emergency cesarean sections can be predicted by markers for stress, worry and sleep disturbances in first-time mothers. *Acta Obstet Gynecol Scand* 2011; 90(3): 238-44.
9. Ganie MA, Koul S, Razvi HA, Laway BA, Zargar AH. Hyperglycemic emergencies in Indian patients with diabetes mellitus on pilgrimage to Amarnathji yatra. *Indian J Endocrinol Metab* 2012; 16(Suppl 1): S87-90.
10. Balhara YP. Diabetes and psychiatric disorders. *Indian J Endocrinol Metab* 2011; 15(4): 274-83.

11. Van Ness-Otunnu R, Hack JB. Hyperglycemic crisis. *J Emerg Med.* 2013; 45(5): 797-805.
12. Abraham S, Shah NG, Diez Roux A, et al. Trait anger but not anxiety predicts incident type 2 diabetes: The Multi-Ethnic Study of Atherosclerosis (MESA). *Psychoneuroendocrinology* 2015; 60: 105-13.
13. Feil EG, Baggett K, Davis B, et al. Expanding the Reach of Preventive Interventions: Development of an Internet-based Training for Parents of Infants. *Child maltreatment* 2008; 13(4): 334-46.
14. Stewart SM, Fabrizio CS, Hirschmann MR, Lam TH. Developing community-based preventive interventions in Hong Kong: a description of the first phase of the family project. *BMC Public Health* 2012; 12: 106.
15. Weine SM. Developing preventive mental health interventions for refugee families in resettlement. *Fam Process* 2011; 50(3): 410-30.
16. Carter AC, Nicholas JJ. The importance of the complete history in the discovery of a potential suicide: a case report. *Arch Phys Med Rehabil* 2003; 84(3): 460-1.
17. Otterman NM, van der Schaaf M, Busch-Westbroek TE, van Schie CH, Nollet F. The use and safety of combined resistance and aerobic training in a patient with complications related to type 2 diabetes: a case report. *Disabil Rehabil* 2012; 34(17): 1495-500.
18. Kyhlback M, Schroder Winter H, Thierfelder T, Soderlund A. Physiotherapy treatment of the diabetic shoulder: a longitudinal study following patients with diabetes and shoulder pain using a pre-post treatment design. *Disabil Rehabil* 2015; 36(7): 556-62.
19. Knapen J, Vancampfort D, Morien Y, Marchal Y. Exercise therapy improves both mental and physical health in patients with major

- depression. *Disabil Rehabil* 2015; 37(16): 1490-5.
20. World Confederation of Physical Therapy. International Organization of Physical Therapists in Mental Health (IOPTMH). 2014; <http://www.wcpt.org/ioptmh> (accessed 22nd Feb 2015).
21. American Physical Therapy Association. What is a Neurologic Physical Therapist? 2013; <http://www.neuropt.org/cons-umer-info/what-is-a-neurologic-physical-therapist> (accessed 22nd Feb 2015);
22. Asante DB, Effah-Yeboah E, Barnes P, et al. Antidiabetic Effect of Young and Old Ethanolic Leaf Extracts of *Vernonia amygdalina*: A Comparative Study. *J Diabetes Res* 2016; 2016: 8252741.
23. Atangwho IJ, Yin KB, Umar MI, Ahmad M, Asmawi MZ. *Vernonia amygdalina* simultaneously suppresses gluconeogenesis and potentiates glucose oxidation via the pentose phosphate pathway in streptozotocin-induced diabetic rats. *BMC Complement Altern Med* 2014; 14: 426.
24. Michael UA, David BU, Theophine CO, Philip FU, Ogochukwu AM, Benson VA. Antidiabetic effect of combined aqueous leaf extract of *vernonia amygdalina* and metformin in rats. *J Basic Clin Pharm* 2010;1(3): 197-202.
25. Eleazu CO, Eleazu KC, Iroaganachi MA. Effect of cocoyam (*Colocasia esculenta*), unripe plantain (*Musa paradisiaca*) or their combination on glycated hemoglobin, lipogenic enzymes, and lipid metabolism of streptozotocin-induced diabetic rats. *Pharm Biol* 2016; 54(1): 91-7.
26. Eleazu CO, Okafor P. Use of unripe plantain (*Musa paradisiaca*) in the management of diabetes and hepatic dysfunction in streptozotocin induced

- diabetes in rats. *Interv Med Appl Sci* 2015; 7(1): 9-16.
27. Eli-Cophie D, Agbenorhevi JK, Annan RA. Glycemic index of some local staples in Ghana. *Food Science & Nutrition* 2016; <http://onlinelibrary.wiley.com/doi/10.1002/fsn3.372/epdf>
28. Ihediohanma NC. Determination of the glycemic indices of three different cassava granules (Garri) and the effect of fermentation period on their glycemic responses. *Pakistan Journal of Nutrition* 2011; 10(1): 6-9.
29. Van Olmen J, Marie KG, Christian D, et al. Content, participants and outcomes of three diabetes care programmes in three low and middle income countries. *Prim Care Diabetes* 2015; 9(3): 196-202.
30. Roberts AL, Agnew-Blais JC, Spiegelman D, et al. Posttraumatic stress disorder and incidence of type 2 diabetes mellitus in a sample of women: a 22-year longitudinal study. *JAMA Psychiatry* 2015; 72(3): 203-10.
31. Sumner JA, Kubzansky LD, Elkind MS, et al. Trauma Exposure and Posttraumatic Stress Disorder Symptoms Predict Onset of Cardiovascular Events in Women. *Circulation* 2015; 132(4): 251-9.
32. Lloyd CE, Brown FJ. Depression and diabetes. *Current Womens Health Rep* 2002; 2(3): 188-93.
33. Herman JP, Ostrander MM, Mueller NK, Figueiredo H. Limbic system mechanisms of stress regulation: hypothalamo-pituitary-adrenocortical axis. *Prog Neuropsychopharmacol Biol Psychiatry* 2005; 29(8): 1201-13.
34. Jelley W, Larocque N, Borghese M. Perceptions on the essential competencies for intraprofessional practice. *Physiother Can* 2013; 65(2): 148-51.
35. Australian Physiotherapy Association. Position statement: Mental health and

- physiotherapy. (2011). http://www.physiotherapy.asn.au/DocumentsFolder/Advocacy_Position_Mental_Health_2011.pdf (accessed 22nd Feb 2015).
- 36.Kaur J, Masaun M, Bhatia MS. Role of physiotherapy in mental health disorders. *Delhi Psychiatry Journal* 2013; 16(2): 404-8.
- 37.Craft LL, Perna FM. The benefits of exercise for the clinically depressed. *Prim Care Companion J Clin Psychiatry* 2004; 6(3): 104-11.
- 38.Sharma A, Madaan V, Petty FD. Exercise for mental health. *Prim Care Companion J Clin Psychiatry* 2006; 8(2): 106.
- 39.Field T. Massage therapy for infants and children. *J Dev Behav Pediatr* 1995; 16(2): 105-11.
- 40.Parto JA, Evans MK, Zonderman AB. Symptoms of posttraumatic stress disorder among urban residents. *J Nerv Ment Dis* 2011; 199(7): 436-9.
- 41.Davis RG, Ressler KJ, Schwartz AC, Stephens KJ, Bradley RG. Treatment barriers for low-income, urban African Americans with undiagnosed posttraumatic stress disorder. *J trauma Stress* 2008; 21(2): 218-22.
- 42.McEwen BS. Central effects of stress hormones in health and disease: understanding the protective and damaging effects of stress and stress mediators. *Eur J Pharmacol* 2008; 583(2-3): 174-85.
- 43.Penckofer S, Schwertz D, Florczak K. Oxidative stress and cardiovascular disease in type 2 diabetes: the role of antioxidants and pro-oxidants. *J Cardiovasc Nursing* 2002;16(2): 68-85.
- 44.Maritim AC, Sanders RA, Watkins Iii JB. 'Diabetes, oxidative stress and antioxidants: A review'. *J Biochem Mol Toxicol* 2003; 17(1): 24-38.
45. Hamer M, Chida Y. Intake of fruit, vegetables, and antioxidants and risk of type 2 diabetes: systematic review and meta-

analysis. *J Hypertension* 2007;
25(12): 2361-9.