WORLD JOURNAL OF PHARMACEUTICAL RESEARCH
SJIF Impact Factor 7.523
Volume 6, Issue 2, 68-76. Review Article ISSN 2277– 7105

A REVIEW ON TREATMENT OF PATIENT ADHERENCE TOWARDS OBESITY CONTRIBUTES TO THE DEVELOPMENT OF TYPE-II DIABETES MELLITUS

Deneshwary Balu[1]*, Teh Soo Pheng[1], Mavis Soo Zi Qing[1], Heng Wei Kee[1], MZ Iqbal[1], Sajida Parveen[2], [1]Syed Ghouse Mohiuddin, [1]Sohail Aziz

[1]Department of Clinical Pharmacy and Pharmacy Practice, Faculty of Pharmacy, AIMST University Malaysia.

[2]Department of Pharmacology, the Islamia University of Bahawalpur Pakistan.

Article Received on
27 Nov. 2016,

Revised on 17 Dec. 2016,
Accepted on 08 January 2017

DOI: 10.20959/wjpr20172-7713

***Corresponding Author**
Deneshwary Balu
Department of Clinical Pharmacy and Pharmacy Practice, Faculty of Pharmacy, AIMST University Malaysia.

1. INTRODUCTION

A number of studies show that the risk of developing type-II diabetes is closely linked to the presence and duration of overweight as well as obesity. Indeed, 90% of individuals with type-II diabetes are either overweight or obese.[16] Lipid accumulation in obesity triggers a low-grade inflammation that results from an imbalance between pro- and anti-inflammatory components of the immune system and act as the major underlying mechanism for the development of obesity-associated diseases, notably insulin resistance and type-II diabetes.[14] Obese adipose tissues (AT) shows hallmarks of chronic low-grade inflammation, which is believed to facilitate the development of insulin resistance.[1] Insulin resistance is defined as a decreased response of the peripheral tissues to insulin action. Individuals with insulin resistance are predisposed to developing type-II diabetes mellitus (T2DM). Increasingly, insulin resistance has been recognized as the integral feature of the so-called metabolic syndrome, which includes glucose intolerance, insulin resistance, obesity, hypertriglyceridemia, low HDL cholesterol, hypertension, and accelerated atherosclerosis.[2] The cluster of pathologies known as metabolic syndrome, including obesity, insulin resistance, type-II diabetes, and cardiovascular disease (CVD), has become one of the most serious threats to human health. The dramatic increase in the incidence of obesity in most parts of the world has contributed to the emergence of this disease cluster, particularly insulin resistance and type-II diabetes.[3] Obesity is commonly associated with insulin resistance and hyperinsulinemia and is a major

risk factor for the development of type-II diabetes and cardiovascular disease.[5] Obesity is an epidemic, calling for innovative and reliable pharmacological strategies. ShK-186 shows that, a selective and potent blocker of the voltage-gated Kv1.3 channel, counteracts the negative effects of increased caloric intake in mice with a diet which rich in fat and fructose. ShK-186 reduced weight gain, adiposity and fatty liver, decreased blood levels of cholesterol, sugar, HbA1c, insulin and leptin and enhanced peripheral insulin sensitivity. These changes mimic the effects of Kv1.3 gene deletion. ShK-186 did not alter weight gain in mice on a chow diet, suggesting that the obesity inducing diet enhances sensitivity to Kv1.3 blockade.[13] There is a growing evidence that Fatty acid-induced β cell apoptosis shows a link between obesity and diabetes.[4] Peroxisome Proliferator Activated Receptors (PPARs) are members of the nuclear hormone receptor super family. Three subtypes are described: PPARa, PPARd and PPARg, encoded by different genes. PPARs form heterodimers with retinoic X receptors (RXR) and regulate transcription of various genes after binding to PPAR Response Elements (PPREs). PPARg is implicated in adipocyte differentiation 1±3 and regulates lipid and glucose homeostasis.[6] A higher body mass index (BMI) is a strong predictor of type-II diabetes (T2D), with a linear increase in diabetes risk across the whole spectrum of BMI. Although, diabetes risk is highest in obese people with BMI~30 kg/m^2, a great proportion of future cases comes from the large population of overweight individuals with a BMI between 25 and 30 kg/m^2. Recent national figures from the US and UK suggest that at least one third of the population is now overweight and another third (24% UK) is obese [with severe implications for the future burden of diabetes.[7] In contrast, obesity increases the risk of chronic age-related diseases, such as type-II diabetes, heart disease, osteoarthritis, certain types of cancer, and thus constitutes a major and rising global health problem.[8] Moreover, leptin treatment ameliorated type-II diabetes mellitus and resolved hypogonadism. This study has three unique features: (1) Firstly, it represents the only opportunity to study the effects of leptin in leptin-naive adults. (2) Secondly, it describes hormone replacement treatment of a genetic form of obesity in adults and thirdly, it addresses the effects of leptin replacement in the only individual identified with leptin-deficiency who has a diagnosis of type-II diabetes mellitus. (11). Prevalence of childhood obesity is increasing world widely. This development is accompanied by an increased prevalence of type-II diabetes mellitus.[15]

KEYWORDS: Diabetes Mellitus, Physicians attitude, Obesity, type-II Diabetes Mellitus, patient Adherence.

2. MATERIALS AND METHODS

2.1 Systemic literature search: A systemic literature search was conducted to identify interventions containing information on investigating adherence to medical treatment of diabetic patients. Apart from this article, that focus upon studies on overweight and obese individuals issues were also collected to observe if an increase in weight of an individual would indirectly cause type-II Diabetes. Search terms consist of result of an overweight or obese patient will cause type-II diabetes for a prolong time.

2.2 Study Selection: Studies in primary care, outpatient, community settings and hospital settings were included. Randomized controlled trials, controlled before and after studies, observational studies were appropriate for inclusion. Complete articles were retrieved for further assessment if the information given suggestions of that study.

1. Include patients with type-II diabetes mellitus
2. Patients whom are overweight or obese
3. Insulin tolerance or ineffective due to overweight problems
4. Issues of patient's adherence to weight control and medication dose as indicated by the medical physician.
5. Aimed at patients as well as health care providers
6. Used a design as described in the inclusion criteria for study design.

2.3 Data Collection: All trials identified for inclusion were independently assessed. Trial quality was assessed and the extracted data was required. Researches were not blinded about information on authors and journals. The quality of an individual trial was assessed by scoring a list of nine topics: randomization, concealment of allocation, patient blinding, blinding of administrator of treatment, blinding of outcome assessment, description of losses to follow-up or withdrawals, intentional to treat analysis, similarity of groups at the start of the study and groups equally provided of care. Quality assessment was done individually by every individual researcher by scoring on these questions where answers were compared afterward. Overall quality was graded as A (good), B (medium), C (poor), by mutual agreement. The extracted data were entered in a structured Excel sheet. Studies with comparable interventions were grouped and the results were synthesized in a narrative way.

3. RESULT

3.1 Methodology quality: The quality of the included studies was overall satisfactory except for one which did not support and prove that diabetes cause is related to weight gain. Even though the lipotoxic etiology of human adipogenic diabetes not proven directly the fact that troglitazone, an agent that reduces islet fat in ZDF rats and prevents their diabetes, is equally efficacious in the human form of the disease is consistent with a common aetiology. It is therefore possible that prophylactic interventions that reduce fat accumulation and no production in islets will prevent the anticipated epidemic of obesity associated NIDDM in the U.S.[4] Laboratory tests and experiments were done to investigate and proof that there is a relation between obesity and diabetes mellitus, for example, article[1, 2, 3, 5, 6, 8, 11, 13] and.[14] Clinical survey follow up was also conducted in article.[7] A prospective study was conducted in article[9] and.[16] White Hall Cohort Studies was under went using Oral Glucose Tolerance Test (OGTT) in abstract.[10]

a) Data Collection from Hospital Databases: Ascertainment of incident type-II diabetes involved a review of the existing data sets at each centre using multiple sources of evidence including self-report, linkage to primary-care registers, secondary-care registers, medication use (drug registers), hospital admissions and mortality data. Information from any follow-up visit or external evidence with a date later than the baseline visit was used.[6] An analysis was based on cross-sectional data collected , the overall design of the survey was a modification of the Third National Health and Nutrition Examination Survey (NHANES III), conducted by the US National Center for Health Statistics.[12]

b) Questionnaire distribution: Research nurses administered to each man a standard questionnaire including questions on smoking habits, alcohol intake, physical activity and medical history. Details of classification methods for smoking status, social class, physical activity and body mass index have been reported. Physical measurements were made and non fasting blood samples taken. Five years after screening, a postal questionnaire similar to that administered at screening, was sent to all surviving men and detailed information obtained on changes in smoking behaviour, body weight, and other risk factors.[9]

c) Laboratory Test: Frozen plasma samples that had been stored were included in this analysis. All subjects were between 18 and 50 years of age, non smokers at the time of the study and except for type-II diabetes in 17 Pima Indians, healthy according to a physical examination and routine laboratory tests. No subject had clinical or laboratory signs of acute

infection and none had a history of, or presence of, clinically evident cardiovascular disease.[5]

Anthropometric measurements

Body composition was estimated by total body dual energy x-ray absorptiometry (DPX-L; Lunar Corp., Madison, WI) with calculation of percent body fat, fat mass and fat-free mass as described.[5] Waist and thigh circumferences were measured at the level of umbilicus and the gluteal fold in the supine and standing position, respectively and the waist-to-thigh ratio was calculated as an index of body fat distribution.[5]

3.2 Intervention

In terms of therapeutics, our findings suggest that interventions that regulate the ER stress response offer new opportunities for preventing and treating type-II diabetes.[3]

3.3 Quantitative synthesis

Studies from[1, 2, 3, 4, 5, 6, 8, 11, 13] and [14] shows that an increase in weight directly influences the chances of getting diabetes mellitus. While Clinical survey follow up was also conducted showing result based on 12,403 incident cases of T2D identified in 26 centres in eight European countries as part of the Interact case cohort study showed independent, significant contributions of both BMI and WC to the risk of T2D. We found greater HRs for WC in women, compared to men, in analysis of standardised, continuous measures as well as using recommended clinical thresholds for abdominal obesity. In terms of absolute risk, 7% of men and 4.4% of women who were overweight and had a large WC at baseline developed diabetes over a 10 years period, placing them at an absolute risk equivalent to or higher than that of obese participants.[7] A prospective study was conducted in this 20 years follow up study and possibly reflecting the duration of obesity and its consequences, increasing BMI was associated with a progressive and significant increase in the adjusted risk of major CVD and diabetes even after additional adjustments for systolic blood pressure and total cholesterol.[9] 20 years follow up study and possibly reflecting the duration of obesity and its consequences, increasing BMI was associated with a progressive and significant increase in the adjusted risk of major CVD and diabetes, even after additional adjustments for systolic blood pressure and total cholesterol. Moderate weight reductions (5–10%) have been shown to be associated with an improvement in blood pressure, blood lipids, 3–7 insulin sensitivity and glycolated haemoglobin.[9]

4. DISCUSSION

The present study revealed two important findings. First, the confirmation of previous findings that obesity and type-II diabetes are associated with low plasma adiponeptin concentrations and indicated that this hypo-adiponectinemia is evident across different ethnic groups with marked differences in the propensity for obesity, type-II diabetes, and atherosclerosis. Second, the results and fasting insulinemia than to adiposity and glycaemia, which suggests that the hypo-adiponectinemia in people with obesity and type-II diabetes is in large part attributable to insulin resistance and/or hyperinsulinemia.[5] Studies demonstrate the presence of Kv1.3 in human BAT, it may provide a rationale for evaluating ShK-186's effectiveness as an inducer of energy expenditure in obese humans. The liver, a key organ for whole-body energy metabolism balance and signal integration, is a second target for ShK-186 therapy. ShK-186 therapy caused widespread changes in central energy and lipid metabolism in the liver, which may contribute to the peptide's anti-obesity effects.[13] Laboratory tests and experiments have being conducted at overseas to prove the point. But a collection of statistical reading on patient information such as weight, BMI, age, daily life style has not yet being conducted yet in the South pacific. In addition to obese and severely obese individuals, at high risk of diabetes, more than a third of the population in the US and UK is overweight. These individuals' risk of T2D is much less well defined, despite its potentially greater contribution to the absolute burden of diabetes and related complications. We show that assessment of WC identifies those at high risk of T2D among the large group of individuals who are overweight.[7] Moderate weight reductions (5%–10%) have been shown to be associated with an improvement in blood pressure, blood lipids, 3–7 insulin sensitivity and glycolated haemoglobin.[9] In the context of diabetes prevention, it may therefore not be optimal to focus only on promoting weight loss in the most obese individuals, but also aiming at preventing small weight gains in the entire population (i.e., shifting the entire BMI distribution to the left). This will only give a small benefit to each individual, but may prove effective at the population level in terms of preventing diabetes and CVD events in the future.[10] It remains to be shown how the inflammatory response initiated in WAT ultimately causes systemic insulin resistance. Increased lipolysis is one possible piece of the puzzle. The observed increase of lipolysis in obese WAT could result in the release of a large amount of FFAs, and an increased FFA level in the circulation has been shown to result in resistance to insulin signalling in skeletal muscle and liver. Therefore, it is possible that FFAs are an important link between chronic adipose inflammation and systemic insulin resistance.[2] However, in the presence of chronic ER stress, such as we see in obesity, the effect of ER

stress on metabolic regulation would lead to the development of insulin resistance and, eventually, type 2 diabetes.[3] WC is independently and strongly associated with T2D, particularly in women, and should be more widely measured. If targeted measurement is necessary for reasons of resource scarcity, measuring WC in overweight individuals may be an effective strategy since it identifies a high-risk subgroup of individuals who could benefit from individualised preventive action.[7] In this 20 years follow up of middle aged men, overweight/ obesity is associated with a significant increase in risk of major CVD and diabetes even after additional adjustment for systolic blood pressure and total cholesterol. Our findings provide evidence supporting the benefits of weight reduction in overweight/obese men 3(3) and suggest that the younger the age at intervention the greater the probable benefit.[9] Compared with lifestyle changes alone, or list at plus lifestyle changes resulted in a greater reduction in the incidence of type 2 diabetes over 4 years and produced greater weight loss in a clinically representative obese population. Difference in diabetes incidence was detectable only in the IGTT subgroup; weight loss was similar in subjects with IGTT and or NGT.[16]

5. CONCLUSION

The question whether obesity and weight gain would improve treatment of patient adherence towards type-II diabetes mellitus still has some misconceptions cause not all the abstracts has proof example, although there is currently no experimental evidence to support this, it is at least possible that adiponeptin itself may affect insulin sensitivity and/or insulinemia.[5] But regardless of some mishap there are some survey base abstract that shows and proof the alternate answer.

In the end only eleven studies could be included in this subgroup analysis of a systematic review. Though, the term 'adherence' is often mentioned in titles or abstracts, adherence itself is not the subject of the research presented.

It is important though to state that this review did not show evidence that educational interventions may be ineffective or even harmful. Finally, this review process point at how trustworthy research in the future should be conducted.

REFERENCES

1. Antonios Chatzigeorgioua, Tom Seijkensd, Barbara Zarzyckae, Blocking CD40-TRAF6 signaling is a therapeutic target in obesity-associated insulin resistance, Contributed by Andrew V. Schally, January 9, 2014.

2. Haiyan Xu, Glenn T. Barnes, Qing Yang, Guo Tan, Daseng Yang, Chieh J. Chou, Jason Sole, Andrew Nichols, Jeffrey S. Ross, Louis A. Tartaglia, and Hong Chen, Chronic inflammation in fat plays a crucial role in the development of obesity-related insulin resistance, Millennium Pharmaceuticals Inc., Cambridge, Massachusetts, USA October 9, 2003.
3. Umut O ¨zcan, Qiong Cao, Erkan Yilmaz, Ann-Hwee Lee, Neal N. Iwakoshi, Esra O ¨zdelen, Gu ¨rol Tuncman,1 Cem Go ¨rgu ¨n, Laurie H. Glimcher, Go ¨khan S. Hotamisligil, Endoplasmic Reticulum Stress Links Obesity, Insulin Action and Type 2 Diabetes, www.sciencemag.org Science, 15 October 2004; 306.
4. Michio shimabukuro, yan-ting zhou, moshe levi and roger h. Unger, Fatty acid-induced b cell apoptosis: A link between obesity and diabetes, Proc. Natl. Acad. Sci. USA, March 1998; 95: 2498–2502 Medical Science.
5. Christian weyer, tohru funahashi, sachiyo tanaka, kikuko hotta, yuji matsuzawa, richard e. Pratley and p. Antonio tataranni, Hypoadiponectinemia in Obesity and Type 2 Diabetes: Close Association with Insulin Resistance and Hyperinsulinemia, 0021-972X/01/$03.00/0 2001; 86(5) The Journal of Clinical Endocrinology & Metabolism Printed in U.S.A. Copyright © by The Endocrine Society.
6. A Meirhaeghe, L Fajas, N Helbecque, D Cottel, J Auwerx, SS Deeb, P Amouyel, Impact of the Peroxisome Proliferator Activated Receptor $_{\gamma}$2 Pro12Ala polymorphism on adiposity, lipids and non-insulin-dependent diabetes mellitus, International Journal of Obesity 2000; 24: 195±199 ß 2000 Macmillan Publisher Ltd All rights reserved 0307±0565/00.
7. Long-Term Risk of Incident Type 2 Diabetes and Measures of Overall and Regional Obesity: The EPICInterAct Case-Cohort Study, The InterAct Consortium (2012) Long-Term Risk of Incident Type 2 Diabetes and Measures of Overall and Regional Obesity: The EPIC-InterAct CaseCohort Study. PLoS Med, June 5, 2012; 9(6): e1001230. doi:10.1371/journal.pmed.1001230.
8. Steve Horvatha, Wiebke Erhart, Mario Broschd, Ole Ammerpohle, Witigo von Schönfels, Markus Ahrens, Nils Heits, Jordana T. Bell, Pei-Chien Tsai, Tim D. Spector, Panos Deloukash, Reiner Siebert, Bence Sipos, Thomas Becker, Christoph Röcken, Clemens Schafmayer and Jochen Hampe, Obesity accelerates epigenetic aging of human liver, Edited by David W. Russell, University of Texas Southwestern Medical Center, Dallas, TX and approved September 15.

9. S Goya Wannamethee, A Gerald Shaper, Mary Walker, Overweight and obesity and weight change in middle aged men: impact on cardiovascular disease and diabetes, J Epidemiol Community Health, 2005; 59: 134–139. doi: 10.1136/jech.2003.015651.
10. Dorte Vistisen, Daniel R. Witte, Adam G. Taba ´k, Christian Herder, Eric J. Brunner, Mika Kivima, Kristine Færch, Patterns of Obesity Development before the Diagnosis of Type 2 Diabetes: The Whitehall II Cohort Study. PLoS Med 11(2): e1001602. doi:10.1371/journal.pmed.1001602, February 11, 2014.
11. Julio Licinio, Sinan Caglayan, Metin Ozata, Bulent O. Yildiz, Patricia B. de Miranda, Fiona O'Kirwan, Robert Whitby, Liyin Liang, Pinchas Cohen, Shalender Bhasin, Ronald M. Krauss, Johannes D. Veldhuis, Anthony J. Wagner, Alex M. DePaoli, Samuel M. McCann, and Ma-Li Wong, Phenotypic effects of leptin replacement on morbid obesity, diabetes mellitus, hypogonadism and behavior in leptin-deficient adults, © 2004 by The National Academy of Sciences of the USA.
12. Tazeen H. Jafar, Nish Chaturvedi, Gregory Pappas, Prevalence of overweight and obesity and their association with hypertension and diabetes mellitus in an Indo-Asian population, CMAJ • October 24, 2006 • 175(9) | 1071 © 2006 CMA Media Inc. or its licensors.
13. Sanjeev Kumar Upadhyay, Kristin L. Eckel-Mahan, M. Reza Mirbolooki, Indra Tjong, Stephen M. Griffey, Galina Schmunk, Amanda Koehne, Briac Halbout, Shawn Iadonato, Brian Pedersen, Emiliana Borrelli, Ping H. Wang, Jogeshwar Mukherjee, Paolo Sassone-Corsi and K. George Chandy, Selective Kv1.3 channel blocker as therapeutic for obesity and insulin resistance, University of California, Irvine, CA and approved April 30, 2013.
14. Lan Wu, Vrajesh V. Parekh, Joseph Hsiao, Daisuke Kitamura and Luc Van Kaer, Spleen supports a pool of innate-like B cells in white adipose tissue that protects against obesity-associated insulin resistance, University of California, San Francisco, CA and accepted by the Editorial Board September 15, 2014.
15. M Wabitsch, H Hauner, M Hertramp, R Muche, B Hay, H Mayer, W Kratzer, K-M Debatin and E Heinze, Type II diabetes mellitus and impaired glucose regulation in Caucasian children and adolescents with obesity living in Germany, International Journal of Obesity, 2004; 28: 307–313 & 2004 Nature Publishing Group All rights reserved 0307-0565/04.
16. Jarl S. Torgerson, MD, Phd Jonathan Hauptman, MD Mark N. Boldrin, MS LARS SJ¨OSTR¨OM MD, Phd, XENical in the Prevention of Diabetes in Obese Subjects (XENDOS) Study, Diabetes Care, 2004; 27: 155–161.