

DIABETES MELLITUS: A MAJOR PUBLIC HEALTH PROBLEM IN PALESTINE**Dr. Hassan Ata Abu Obaid***

Israa University, Gaza Strip, Palestine.

***Corresponding Author: Dr. Hassan Ata Abu Obaid**

Israa University, Gaza Strip, Palestine.

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ABSTRACT

Introduction Diabetes mellitus (DM) has reached pandemic proportions worldwide. The International Diabetes Federation estimated the worldwide prevalence of DM at 415 to 642 million by 2024. According to the Palestinian Ministry of Health, the prevalence rate was 10.5% in the West Bank and 11.8% in the Gaza Strip among the registered Palestinian refugees aged 40 years and older (UNRWA, 2007). A study conducted by Almoutaz in 2011 to estimate the prevalence rate it found was 9.6%. Diabetes is one of the four priority non-communicable diseases (NCDs) identified by the WHO along with cardiovascular disease (CVD), which includes heart attack and stroke, cancer, and chronic respiratory disease. Diabetes is common, chronic, and costly. Many of the risk factors leading to Type 2 diabetes, which is the common form of diabetes, are modifiable. Examples are obesity, unhealthy diet, physical inactivity and smoking. **Conclusion** This review has to describe the magnitude of the Diabetes Mellitus, A Public Health problem in Palestine, Impact of diabetes, Risk Factors of diabetes, Health services provided for diabetic patients in Palestine, Mortality of diabetes, cost, and identified the barriers and challenges of diabetes care, and provided information about how to Prevent and development of Diabetes according to the Global Plan 2011-2021, then to reduce the incidence and prevalence rate.

KEYWORDS: Diabetes mellitus, Diabetic foot, Gaza Strip, Palestine.**INTRODUCTION**

Diabetes mellitus (DM) is a rapidly growing public health problem. It is a metabolic disease characterized by hyperglycemia resulting from defects in insulin secretion, insulin action or both. 'Long-term complications of diabetes include retinopathy with potential loss of vision; nephropathy leading to renal failure; peripheral neuropathy with risk of foot ulcers, amputations and high incidence of cerebrovascular disease and hypertension (ADA, 2014). The World Health Organization estimates that about 347 million people globally have diabetes and projects that diabetes will be the seventh leading cause of death in 2030 and Most diabetes deaths (more than 80%) occur in low- and middle-income countries (WHO, 2014). The International Diabetes Federation estimated the worldwide prevalence of DM at 415 million adults in 2015 and this figure is expected to increase to 642 million by 2040 (IDF, 2015). According to the National Diabetes Statistics Report In USA More than 100 million Americans are living with diabetes 30.3 million or prediabetes 84.1 million (NDR, 2017). The Worldwide, about 8% of people suffer from diabetes. In the Middle East, more than 10% have the disease. Residents of the Palestine, with diabetes rates approaching 15-20%, are in an unhealthy class of their own and the reason is lack of awareness on how to treat and how to prevent the disease from occurring and

Another is high levels of obesity, a major risk factor for diabetes. (WDF, 2015). In Palestine, the prevalence rate was 10.5% in the West Bank and 11.8% in the Gaza Strip among the registered Palestinian refugees aged 40 years and older (UNRWA, 2007). A study conducted by Almoutaz in 2011 to estimate the prevalence rate it found was 9.6% (Almoutaz, et al., 2011). In Palestine, ageing populations, sedentary life and changing lifestyles are rapidly increasing the spread of DM along with other chronic diseases lead to rose from 6.6% in 1980 to 16.5% in 2014 (NCD, 2016). According to the Palestinian Ministry of Health still DM ranks 4th in the causes of death in GS, where it represented 8.9% of all deaths in 2014 (MOH, 2014). Diabetes is one of the four priority non-communicable diseases (NCDs) identified by the WHO along with cardiovascular disease (CVD), which includes heart attack and stroke, cancer, and chronic respiratory disease. Diabetes is common, chronic, and costly (IDF, 2011). Because the increase in the prevalence of diabetes which poses a large challenge to the health system we need to take effective interventions to reduce diabetes prevalence To maintain Healthy Palestinian community.

Characteristics of Type 2 Diabetes

Diabetes is a metabolic disease characterized by elevated concentrations of blood glucose for prolonged periods of

time, *i.e.*, hyperglycemia (Hakeem, and Fawwad, 2010). insulin resistance, and increased hepatic glucose production and these metabolic abnormalities are treated by use of various medications which are designed to correct one or more of metabolic abnormalities (Gerich, J.E. 2005), (Saltiel, and Olefsky, 2001). The complications of type 2 diabetes from micro-vascular and macro-vascular diseases can have a devastating effect on quality of life and impose a heavy burden on healthcare systems. The treatment for type 2 diabetes differs at various stages of the condition. In its early stages, many people with type 2 diabetes can control their blood glucose levels by losing weight, eating properly and exercising. Many may subsequently need oral medication, and some people with type 2 diabetes may eventually need insulin shots to control their diabetes and avoid the disease's serious complications (Saltiel, and Olefsky, 2001). Even though there is no cure for diabetes, proper treatment and glucose control enable people with type 2 diabetes to live normal, productive lives. A major advance for people at risk of developing type 2 diabetes-such as family members of those with the condition-occurred recently when it was shown that diet and exercise can prevent or delay type 2 diabetes. People at high risk, who already had early signs of impaired glucose tolerance, significantly reduced their risk by losing only 5 - 7 percent of their body weight and performing moderate physical activity for 30 minutes/day. (Saltiel, and Olefsky, 2001). Diabetes is associated with a 2- to 4-fold increase in cardiovascular mortality and stroke. Also, 75% of individuals with type 2 diabetes die from cardiovascular causes [24]. Diabetic neuropathy is present in 12% of people at diagnosis and diabetic neuropathy affects approximately 70% of people with diabetes and is a leading cause of non-traumatic lower extremity amputations. Therefore, early detection and treatment of diabetes is essential in order to reduce the impact of its serious complications(Saltiel, and Olefsky, 2001).

Mortality of Diabetes

People with diabetes have higher all-cause mortality rates than similar people without diabetes mainly attributable to cardiovascular causes (Roper, 2001). Diabetes of all types can lead to complications in many parts of the body and can increase the overall risk of dying prematurely (WHO, 2016). In 2015 there were 1.6 million deaths worldwide directly caused by diabetes. It was the eighth leading cause of death among both sexes and the fifth leading cause of death in women in 2012, and 43% of all deaths due to high blood glucose occur before the age of 70(WHO, 2016). According to American Diabetes Association the Diabetes remains the 7th leading cause of death in the United States in 2015, with 79,535 death (ADA, 2017). According to International Diabetes Federation the Middle East and North Africa, four out of ten adults with diabetes are undiagnosed (IDF, 2015). The WHO report show have a result about MORTALITY RATES PER100 000 BYWHO REGION, AGE 20+ in the Middle East 139.6

(WHO. 2016). In Palestine in 2015 there were 869 death due to Diabetes with incidence rate 19.7/100 000(MOH.2015). According to the Palestinian Ministry of Health still DM ranks 8 th in the causes of death in Palestine, where it represented 8.9% of all deaths in 2014 (MOH, 2015).

The cost of diabetes care

Diabetes results in high healthcare costs, loss of labour productivity and decreased rates of economic growth. Globally, healthcare expenditure for diabetes totaled USD 465 billion in 2011, equivalent to 11% of total health spending. Without an investment in making effective treatments for preventing diabetes complications widely available, this is predicted to rise to USD 595 billion by 2030(IDF, 2011). Expenditures spent on diabetes care are not evenly distributed across age and gender groups More than three-quarters of the global expenditure in 2010 will be used for persons who are between 50 and 80 years of age. Also, more money is expected to be spent on diabetes care for women than for men. There is a large disparity in healthcare spending on diabetes between regions and countries. More than 80% of the global expenditures on diabetes are made in the world's economically richest countries, not in the low- and middle-income countries where 80% of people with diabetes will soon live(IDF, 2011). According to Palestinian Central Bureau of Statistics & Ministry of Health The Government spending on healthcare of Palestine is about 12.3 % of GDP or US\$1.3 billion, Between 2000 and 2013, expenditure on referrals increased from US\$8 million to US\$52 million, because The lack of availability of certain treatments, medications, medical staff, equipment and infrastructure within the public system has led to the creation of a referral abroad (PCBS, 2014).

In Palestine, there is no data about health expenditure due to diabetes and diabetic foot, The only available data is about the costs of direct diabetes medications (MOH, 2014).

Health care system

Health care services in Palestine are provided by four sectors, which is Ministry of Health (MOH), UNRWA, Medical Military Services, Non-Governmental Organizations (NGOs) and private sector. MOH is the main health care provider; it provides primary, secondary and tertiary services and purchases some services from private providers locally and abroad (MOH, 2011). The current Palestinian health system is made up of fragmented services that grew and developed over generations and different regimes.

Health services provided for diabetic patients in Gaza Strip

At governmental sector, health services - particularly for diabetic patients -are provided through a multidisciplinary system including primary, secondary, and tertiary health services.

At primary level, health services are provided in Primary Health Care Centers (PHCCs), these services include:

Identification and diagnosis of people with diabetes by annual screening for DM and 6-monthly for hypertension if they are 40 years or older during attendance to the PHCCs, and Initial assessment and care at confirming diagnosis of DM, and patients are clinically assessed for complications and co-morbidities such as hypertension, foot examination, and Patients are managed according to a standard algorithm with diet and lifestyle modification, oral hypoglycemic medication (Glibenclamide, Glicazide and metformin) and insulin, and are assessed as having controlled or uncontrolled DM.

- Health education and advices about life style and diet.
- Medications given in the PHCCs are free of charge.

At secondary level, health services are provided in the hospitals, these services include: emergency services, admission to inpatient wards, intensive treatment to manage uncontrolled blood sugar levels, surgical intervention (debridement, and amputations), consultation, various laboratory tests.

At tertiary level, rehabilitation services and training to adjust for disabilities resulted from loss of extremity (due to amputation). These services are provided through physiotherapy departments in the governmental hospitals.

Health Services in the Local Community

The health services in the community in Gaza Strip are not enough and diabetes health management programme in the community health clinics does not provide enough help and support to the patients. Shortage of specialist doctors in diabetes and expensive consultation with private doctors make the life of patients more difficult in terms of managing their diabetes in the Gaza Strip. The chronic disease care is mostly integrated into the public health system through primary health care centers, Usually people with diabetes are referred from primary health-care clinics to specialist diabetes centers but in Gaza strip no specialist centers in primary health-care clinics. According to WHO report about NCD services in health care system n Gaza Strip it showed some Weakness' point such as lacked standardization and supervision system, lack of protocols and tools for early detection, unreliable supply of essential NCD medicines, MoH facilities, and use of multiple providers that do not use the same treatment protocols notably UNRWA and MoH, Use of multiple providers challenges a central concept of effective NCD management: continuous comprehensive care by the same provider over time (WHO, 2014). During 2013 In Al Shifa hospital new unit established to care and manage the diabetic foot ulcer, the team of this unit contain endocrinologist ,specialist in vascular, and nurse, this unit provide services to all resident in Gaza city just. According to DF unit in Al Shifa hospital report the number of diabetic foot patient

annually around 4000 to 5000 patient, and approximately 6-8% amputation in Shifa hospital (MOH, DFU, 2013). In west bank new activities from the community as A mobile clinic with specialized doctors, nurses, nutritionists and podiatrists, The clinic - a large truck stocked with free treatment options - is at the forefront of the battle against diabetes, which has now become the leading indirect cause of death in Palestine as the main risk factor for developing cardiovascular disease, according to the World Health Organization The mobile clinic is our only alternative for diabetes treatment. We live a life of poverty (Al Jazeera net, 2017). We need more effort to expanded this effort in west bank and at major hospital in Gaza strip and to standardization of care about diabetic patient then to improve care about diabetic patient.

Barriers to Diabetes Care

It was identified by (Glasgow et al, 2001) that two types of barriers (internal and external) exist. The internal barriers to diabetes care (self-management) include psychosocial and cultural, attitude and psychosocial barrier is related to interpersonal factors that impede diabetes self-management, the external barrier is related to biological factor such as organization of medical care and community and cultural influences (Starfield, 2003).

Personal Barrier

qualitative study among low-income minority diabetics it showed the Attitudes, perceptions and behaviors surrounding diabetes and self-management of the condition did vary across individuals, however, the variation appeared to reflect the individual's knowledge and opinions rather than patient's age, sex, or culture.(Nneka Onwudiwe, et al, 2011). Another study conducted that aim to systematic review is to summarize existing knowledge regarding various barriers of diabetes management from the perspectives of both patients and clinicians the article published between 1990 and 2009, addressing type 2 diabetes, patient's barriers, clinician's barriers, and self-management the study showed the Patients' adherence, attitude, beliefs, and knowledge about diabetes may affect diabetes self-management. Culture influence the patient's health beliefs, attitudes, health literacy, thereby affecting diabetes self-management.(Nam, S, et al, 2011). A Recent study in Palestine that aim to assess medication adherence and its potential association with beliefs and diabetes – related knowledge in patients with type II DM, the study showed that non-adherence was significantly associated with diabetes-related knowledge, beliefs about necessity of the anti-diabetic medications, concerns about adverse consequences of anti-diabetic medications, and beliefs that all medicines are essentially harmful Beliefs and knowledge are important Barriers to understanding variations in medication adherence among diabetic patients (Sweileh, et al, 2014). Finally, improving knowledge of diabetic patients about their illness can positively influence their medication adherence and therapeutic outcome.

Administration Barrier

According to Diabetes Voice report the People with diabetes in Gaza do not receive the support of dieticians, foot specialists, psychologists or diabetes educators. In the standard visit, people with diabetes commonly have the opportunity to monitor their body weight and blood pressure level, and undergo fasting or random blood glucose testing. (Diabetes Voice, 2004). The recent study in Gaza Strip showed two third of the DF patients do not receive any information or instruction about diabetes and DF and had poor knowledge. Unfortunately, several studies have found that primary care physicians infrequently perform foot examinations in diabetic patients during routine office visits (Wylie, 1995)(Bailey,1985). A cross sectional study found that 78.4% of patients had poor information about foot care (Bailey, 1985). Another study showed statistically significant associations between level of education and effective diabetic foot practice (Abu-Qamar, 2014). A study conducted in Gaza Strip about risk factors to diabetic foot ulcer the study found only 29% of cases had visited the doctor to examine their feet for four times and more in the last year (Abu Obaid, and Eljedi, 2015). A Hospital Based conducted in Gaza Strip the study showed Ninety one percent (91%) of our patients were followed up to control of DM either in governmental health center or non-governmental health center. Most of the cases (68.9%) had poor DM controlled (as indicated by their HbA1C level > 7%), these findings suggest that DF is most likely to develop in a diabetic patients with poor control of blood glucose level (Salah, 2016). this is a clear evidence poor management and follow up about DM controlled. it is clear that to definition of these barriers, with subsequent, systematic action to reduce their impact, in both patients and populations could result in an improvement in diabetes outcomes.

Economic Barrier

A study conducted in Gaza Strip that showed that 93 of cases and 84 of controls earn 2500 NIS and less monthly [OR 2.531, 95% CI (0.993 – 6.452) P= 0.046]. This result indicated statistically significant association between income and diabetic foot and that diabetic patients who have low income are 2.5-times at higher risk of developing diabetic foot (Abu Obaid, and Eljedi, 2015). Another study conducted among Arab patients in East Jerusalem with type 2 diabetes the study showed low diabetes self care management and we need more interventions to increase diabetes self care management practices, another found financial barriers(Daoud, et al, 2015). These results were consistent with previous studies that found an association between DF and low economic condition (Balla, et al., 2013; Desalu, 2011). In addition, low average monthly income has been associated with worse diabetic outcomes as it determines the ability to obtain medication and services that improve health (Dunlop, et al., 2000). The Financial status to the patient is significant barrier in keeping a check on blood sugar levels Even if healthcare was free or funded by insurance, patients still had to spend more money on

healthy food, home glucose monitoring kits and transport to and from healthcare appointments, and It is therefore necessary for educators to identify settings and facilitate support groups to promote behavioral changes, and support the vulnerable group by different ways.

Impact of diabetes

According to The American Diabetes Association reports there are 17.9 million Americans that have been diagnosed with diabetes, while 5.7 million are believed to be undiagnosed. 57 million have pre-diabetes, or are at risk for developing diabetes has many different complications that have an impact on society. Diabetics have a higher rate of heart disease, according to the American Diabetes Association. It is also linked to kidney disease, amputations, eye problems that result in blindness and other problems. These complications cause disability and death. They have a direct impact on the health care system, families and loved ones(ADA, 2016). Diabetes is the leading cause of non-traumatic lower limb amputation (Siitonen et al., 1993). people with diabetes, cardiovascular disease is the most common cause of death (Tapp et al., 2004). As a result of these complications, type 2 diabetes can reduce a person's life expectancy by up to 10 years,(Diabetes UK, 2010). and according to the IDF there were around 5 million deaths in 2014 as a result of diabetes and its related diseases. Nearly half of these deaths were of people aged under 60(IDF, 2013). According to the Center for Disease Control and Prevention (CDC), in 2008 alone, more than 70,000 people with diabetes had a leg or foot amputated. Amputations in people with diabetes account for more than 60% of the amputations of legs and feet not resulting from an injury, such as from a car crash. People with diabetes were eight times as likely to lose a leg or foot to amputation as people without diabetes (CDC, 2012). Around the global result Every 30 minutes a limb is lost due to a landmine, and around the global result Every 30 seconds, a limb is lost due to diabetes (Bharara, et al., 2009). According to DF unit in Al Shifa hospital report the number of diabetic foot patient annually around 4000 to 5000 patient, and approximately 6-8% amputation in Shifa hospital (MOH, DFU, 2013). the Consequences of diabetes on health, economy, and social due to amputation or failure of any organ as a complication of diabetes lead to direct effect on diabetic patient, family, and community, so we need to support this group of people by change the polices and strategies.

Prevent the development of Diabetes in Global Plan 2011-2021

Global Diabetes Plan

The International Diabetes Federation IDF Create the Global Diabetes Plan 2011-2021, this Plan calls on the United Nations and its agencies, governments, civil society, the private sector and the global diabetes community to turn the tide of diabetes now.

The Objectives of the Global Diabetes Plan is to:

- 1- Improve health outcomes of people with diabetes
- 2- Prevent the development of type 2 diabetes
- 3- Stop discrimination against people with diabetes

Prevent the development of Diabetes

The key modifiable risk factors for type 2 diabetes are physical inactivity, inappropriate nutrition and obesity. Healthy nutrition and physical activity are not just a matter of personal choice. Social and technological changes over the past few decades have created physical, work, community and leisure environments that are sedentary and based on high energy-low nutrient diets. Countless people face almost insurmountable environmental, social and financial barriers to healthy lifestyle choices on a daily basis (IDF, 2011). Even among many poorer countries, 'obesogenic' and 'diabetogenic' environments are becoming the norm. WHO states that 80% of type 2 diabetes can be prevented by simple cost effective interventions. Major policy changes are needed to sustain healthy weight and physical activity levels. For example, well designed towns and cities underpinned by efficient public transport and food systems that encourage physical activity and healthy eating can help reduce risk factors for type 2 diabetes and many other health risks. Interventions in certain settings have been shown to improve nutrition and increase physical activity. Nonetheless, the Global Diabetes Plan places a high priority on interventions to transform the social, economic and physical environments that are driving the epidemic of obesity and type 2 diabetes (IDF, 2011).

Health in all policies

Government policies in one sector often have unintended effects in others. Most governments in economically developed countries now evaluate the environmental impact of new policies. This approach also needs to be applied to health with particular attention to policies governing urban design and housing, workplace design and work practices, food production, storage, distribution, advertising, pricing and trade. Fiscal, economic and education policies, especially those that impact negatively on people from socio-economically disadvantaged groups within the population are also highly relevant (IDF, 2011). WHO promotes a health impact assessment approach to evaluating the impact of social, environmental and economic policies on health and the Global Diabetes Plan calls on all governments to implement a 'health in all policies' approach. This means assessing the health impact of all new policies on risk factors for diabetes and other NCDs when making infrastructure investments and designing and enacting new policies and ensuring that all policies promote rather than harm health (WHO, 2011).

Make healthy nutrition available for all

Good nutrition is a core building block for promoting health and preventing disease. Both under- and over nutrition increase the risk of type 2 diabetes and diabetes

itself is exacerbated by poor nutrition. Children born to under-nourished mothers are at increased risk of diabetes, as are children and adults who are over nourished but possibly still poorly nourished). Over-and under-nutrition can exist side by side, with both being more evident among people who are socio-economically disadvantaged. Reducing social disparities and social determinants of diabetes and associated NCDs is central to preventing the development of diabetes and its complications (IDF, 2011). Through all stages of life a balance is needed between the amount of energy that individuals consume and the amount of energy they require. Achieving this balance will reduce the risk of diabetes and other NCDs in current and subsequent generations. The WHO Global Strategy for Diet and Physical Activity sets out guidance on what needs to be done and The Global Diabetes Plan calls on governments to implement policies and programmes to address under- and over-nutrition including.

Promote Healthy Nutrition Through

- maternal and child health nutrition programmes
- policies and laws which improve access to affordable,
- good quality food for everyone
- regulation to reduce the fat, sugar and salt content of processed food and beverages and eliminate trans fats
- awareness and behaviour change programmes
- global trade agreements

Promote everyday physical activity

Physical activity plays an important role in reducing obesity and reduces the risk of type 2 diabetes. Physical activity needs to be supported and encouraged in routine everyday activities and through recreational sports (IDF, 2011).

- implement culturally appropriate policies and programmes to reduce sedentary behaviour and to promote physical activity in specific settings, including schools and the workplace.
- establish regulatory frameworks that remove barriers to and promote physical activity. this may include urban design (e.g. ensuring safe and pleasant footpaths/ sidewalks and bicycle lanes), transport and the design of buildings (e.g. encouraging the use of stairs
- establish a physical activity monitoring system to provide statistics on the levels of physical activity in the population (IDF, 2011). Finally According to international diabetes federation the diabetes can largely be prevented We can and must prevent the preventable. The human and financial cost of not intervening will be far greater than the cost of intervening (IDF, 2011).

In the Palestine and the Middle East face an increasing prevalence of diabetes they need Immediate action is needed to halt this public health disaster, the Health care system and primary care is facing the greatest challenges

in managing NCD specially diabetes, siege, scarcity and lack of financial resources is additional challenges, so the health policies we need to change toward WHO strategy to focuses on modifiable Risk Factors like physical inactivity, unhealthy diet, obesity, and smoking then to reduce the number of diabetic patient(WHO, 2011). The recent study in Palestine The overall prevalence of overweight and obesity among students were 18.61% (Farid, & et al, 2014). A study conducted in seven Arab countries Palestine include them and another study about the Prevalence of Overweight and Obesity among Adolescents in 2012 the study show is high prevalence rate of obesity in the Arab countries and consider obesity is the major risk factor to diabetes so There is an urgent need to establish a plan of action to combat obesity in schoolchildren in these countries (Abdulrahman, & et al, 2012). Another risk factors can be prevented smoking A recent study in Gaza Strip the prevalence rate of smoking was 26.3%, with a significantly higher rate among males (31%) than females (6.9%) (Eldalo, 2016). Awareness and knowledge about diabetes in Palestine is not appropriate and some studies showed that one of The studies on diabetes knowledge, beliefs and practices among people with diabetes provided further evidence that there was a lack of information available to people with diabetes. the recent study conducted in Gaza Strip showed that 81 of cases and 49 of controls had secondary education and less [OR 4.437, 95% CI (2.351 – 8.374) P= 0.000]. This result indicated statistically significant association between diabetic foot and level of education, and that those who have low level of education are 4.4-times at higher risk of developing diabetic foot (Abu Obiad, and Eljedi, 2015). Previous studies found an association between DF and illiteracy (Desalu, 2011, Aboalfotouh, et al., 2011). Another study indicated that low level of formal education was a significant risk factor for foot complications (Simon, 2008; Al-Maskari and El-Sadig, 2007). Additionally, Simon (2008) reported that the low mean score of knowledge about foot care was related to not receiving advice on foot care, and that only 48% of patients had received advice on foot care and 27.5% reported to have had their feet examined by the doctor at least once, also, foot self-care behavior improved significantly in patients who had been given advice on foot care and in those whose feet had been examined by the doctor at least once.

Finally the modifiable risk factors among diabetes like physical inactivity, unhealthy diet, obesity, smoking can be prevented by changing the health polices in Palestine by more attention in food production, increase the taxation on the smoking, and encourage the people to sport practices then to reduce the burden of diabetes and economical cost and impact.

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