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PREVENTION OF CARDIOVASCULAR DISEASE RISKS IN YOUTH IN RURAL AREAS

The mission of the community early cardiovascular disease risk prevention program: "Fight against Obesity and Type 2 Diabetes (T2DM) in Youth (FOTY)" is to inspire overweight, obese and T2DM children and their families of medically underserved community to adapt healthy lifestyle. We established a wellness program to deliver knowledge about cardiovascular health, promote good nutrition and age-appropriate physical activity in children in our community.

The main goal of the community early cardiovascular disease risk prevention program: "Fight against Obesity and Type 2 Diabetes in Youth" is to provide knowledge about cardiovascular health, encourage our youth to adapt healthy lifestyle through this wellness program, closely follow the program realization and to create a Center of Art for children in needs to protect and prevent their cardiovascular health.

We expect to produce improved health, well-being, and prognoses for healthy lifestyles among our patients. Participants and their parents will have better knowledge about cardiovascular diseases prevention. They will also learn how to take and maintain important steps towards healthy lifestyle and thereby preventing cardiovascular problem associated with obesity and T2DM. Also, overcome behavioral and emotional problems, improvement in clinical measures such as blood pressure, weight, BMI, Hemoglobin A1c (HbA1c), and lipid profile.

Key words: obesity, diabetes, cardiovascular problem, youth, health life style.

Introduction. One-third of all deaths globally stem from ailments linked to excess weight and its consequences, including T2DM, which is nowadays effects high number of children. Obesity is associated with significant comorbidities and health problems including, but not limited to T2DM, hypertension, coronary artery disease, orthopedic problems, along with other problems such as impaired quality of life and negative self-esteem. Prevention is considered as a best treatment plan and introduction of early healthy lifestyle increases the chance to sustain it for lifetime. It is a time that we address health of our youth to make a substantial contribution to the future. The treatment of obesity in children requires a multidisciplinary, multi-phase approach. Many CV problems are preventable with management of weight and diabetes. Development of 'medical home' for vulnerable children and adolescents living in rural areas needs well-equipped and coordinated CV disease prevention centers. Texas Tech University Health Sciences Center (TTUHSC) serves about a 200 mile radius around Amarillo. In its service area, TTUHSC is the only source for specialized medical care for children with CV diseases. Primary care providers in the 26 northernmost counties of Texas, the Panhandle of Oklahoma, SW Kansas, and eastern New Mexico refer children to our clinics. As TTUHSC physicians, one of our biggest problems is the fast growing number of children with known risk factors for CV diseases. The high risk group includes youth with obesity, diabetes, hypertension, familial hyperlipidemia. The pediatric clinic at Texas Tech University Health Science Center (TTUHSC) at Amarillo serves over 6,000 children and 60% are on Medicaid.

One of the most challenging groups is children with metabolic syndrome, T2DM and hypertension. Obesity in children has reached crisis proportions in Texas with more than 35% of Texas school children classified as overweight or obese [1]. Overweight children are missing 3 to 4 times more school than kids who are not overweight, and often struggle with depression and low self-esteem. Obese kids have an increased risk for developing T2DM and CV disease [1]. Diabetes increase the risk of developing microvascular and macrovascular complications, which in turn have a devastating impact on the quality of life of patients, and challenge health service resources worldwide [2]. Annually in the U.S., an estimated 3,700 youths are diagnosed with T2DM [3]. Recent studies showed that gut microbiome is one of the environmental factors responsible for control of body weight and energy metabolism, and thus linked to obesity and other metabolic disorders, such as T2DM. That is why addressing dietary habits is critically important. The prevalence of multiple CV disease risk factors is high in children and adolescents with T2DM. Early identification of endothelial dysfunction, with subsequent lifestyle modifications or pharmacologic interventions, along with good glycemic control, may reduce or prevent CV diabetic complications [4]. Our preliminary research data directed toward studying endothelial dysfunction in adolescents with diabetes and obesity showed that in the setting of excessive weight, girls' cardiovascular function is more compromised compared to boys.

Girls also have additional psychological problems related to obesity. Obesity during pregnancy may create a metabolically abnormal intrauterine environment that "programs" the developing fetus for an increased lifetime risk of obesity and related diseases. These biological, behavioral, and psychosocial influences create a vicious cycle that may accelerate obesity-related disease and shorten life expectancy [5]. High maternal BMI increases the risk of fetal macrosomia and thus increase the risk for birth asphyxia in term infants. The implications of this global obesity on future generations will be serious unless appropriate action is taken. We hope that establishment of cardiovascular disease risk prevention program in our rural community will tremendously benefit and make great difference to our young generation in the future. We are also confident that our program expertise will be beneficial to American Academy of Pediatrics for the "road map" to improve quality of life of children with CV risk through lifetime modification programs and will be good example that shows community efforts to fight against diseases.

Program goals: The main goal of the COMMUNITY EARLY CARDIOVASCULAR DISEASE RISK PREVENTION PROGRAM: "Fight against Obesity and Type 2 Diabetes (T2DM) in Youth (FOTY)" is to provide knowledge about cardiovascular health, encourage our youth to adapt healthy lifestyle through this wellness program, closely follow the program realisation and to create a Center of Art for children in needs to protect and prevent their cardiovascular health.

Program Description, Part 1 – Summary

The program is carried out at Texas Tech University Health Sciences Center (TTUHSC), Department of Pediatrics, Amarillo, TX. Children of all ages with overweight, obese, and at increased risk for CV diseases, leaving in Panhandle area and adjacent states will be eligible to enter in this program. It also might supplement MEND program, which is now available for city of Amarillo residents and limited to children age from 7 till 13 years old. In more details, if parents and a child are interested to participate into the program, a health promotion coordinator of the program will explain what to expect from the program and how it works in details. The program will provide small groups' lectures and meetings at least once a week for 6 weeks as a start point. Participants is given educational brochures that cover topic such as etiopathogenesis, complication and management of conditions, which predisposed to cardio-vascular diseases in layman language, importance of healthy eating habit and physical activity. At first visit we assess their behavioral and emotional problem and help them to overcome and again we will repeat it during 6 month follow up evaluation to track improvement. Participant receive healthy food coupons of \$ 25 after each session of 6 week and on 6 month follow up evaluation they will receive a mug stating "Fight against Obesity in Youth". Coordinator coordinate and supervise the daily activities of the program and provide a personal link between the participant and their "medical home" at TTUHSC. At least on a weekly communications via telephone and during session between the patients, the patient's family, and the program health promotion coordinator will encourage continued adherence to project dietary and physical activity prescriptions, and reinforce the existence of a true "medical home" for children at risk of CV related diseases. Children, who enter the program, are evaluated by trained PA (Emily Howard), who will perform physical examination; blood pressure measurement; heights and weights to evaluate body-mass index (BMI); measurement of waist circumference, waist-to-hip ratio, skinfold thicknesses. Coordinator supervise overall activities of this program.

Outcome: Participants and their parents will have better knowledge about CV diseases prevention. They will also learn how to take and maintain important steps towards healthy lifestyle and thereby preventing cardiovascular problem associated with obesity and T2DM. Also, overcome behavioral and emotional problems, improvement in clinical measures such as blood pressure, weight, body-mass index (BMI), Hemoglobin A1c (HbA1c), and lipid profile.

Program Description, Part 2 – Details

During 6 months enroll at least 250 children. During initial learning period (6 weeks, once in a week) we will focus on 3 topics: 1) learn about obesity, T2DM and cardiovascular health, 2) approach towards healthy food, and physical activity 3) assessment of behavioral and emotional problems using the PSC-Y Questionnaires (at the beginning of the first session and at the end of the study at 6 months). We also obtain baseline blood pressure measurement, heights and weights to evaluate BMI, measurement of waist circumference, waist-to-hip ratio, and skinfold thickness to identify degree of obesity and fat tissue distribution. A lipid profile (total cholesterol, Low density Lipoprotein (LDL), High density Lipoprotein(HDL), and triglyceride) will be done (if not done during the last year) to screen patient for dyslipidemia. HbA1c (if not done over the last 3 months) will be done: to assess glucose control in T2DM and screen children with obesity for T2DM. Physical activity prescribed according to American College of Sports Medicine recommendations. Program health promotion coordinator will make all the efforts to encourage participants via telephone and during session to complete this program such as regular communicating with participants and their parents regarding their progress and encourage continued program adherence and participation and also reminding them about their upcoming

session. After 6 weeks session we do two follow up evaluation. At 3 and 6 month program's health promotion coordinator will ask participants about their progress and will repeat clinical evaluation by measuring blood pressure, heights and weights to evaluate body mass index (BMI), measurement of waist circumference, waist-to-hip ratio, and skin fold thickness, lipid profile and HbA1c level to see clinical improvement, and reinforce educational programs. Health promotion coordinator will also encourage continued program participation and adherence to program guidelines and assessment of behavioral and emotional problems using the PSC-Y Questionnaires (at the beginning, and at 6 months). After each session of 6 week healthy food coupon of 25 \$ is given to each participants. In addition, at 6 month follow up evaluation we will give each participant a mug stating "Fight against obesity in Youth". Thus, this program will deliver a wellness program to the participants and will be sustained and dynamic in development. Since our program will serve a large rural area, lessons taught and practiced in Amarillo will be carried home for continued use.

Summary of key activities of the program:

1. Train program health promotion coordinator to supervise daily activities of the program.
2. Recruit an individual with health promotion experience.
3. Advertise program, print flyers and educational brochures, purchase healthy food coupons and, a mug stating "**Fight against obesity in Youth**", two additional blood pressure machines with an assortment of cuffs, a body composition analyzer, set account with Quest laboratory for lab work and additional computer/office equipment.

Innovative aspect of the program, Part 1 – Summary

The major innovation of the program is to create a "medical home" focused on cardiovascular health specific for children of underserved, widely spread rural area and low income families. Pulling resources together we will create a focused sustained program that will deliver health education in the form of short lecture and educational brochure to take home, encourage to complete all the sessions, inspire to adapt and continue healthy lifestyle by providing education on benefits of good nutrition, healthy food coupons and prescribing physical activity and also address and help to overcome behavior and emotional problem.

Innovative aspect of the program, Part 2-Detail

With the help of **Fight against obesity and T2DM in Youth** we will:

1. This program is a "medical home" for vulnerable participants which can provide knowledge about disease process and bringing awareness regarding the cardiovascular health via short lecture and educational brochure to take home. Thus, this program will make continuous efforts providing correct direction to the participants to improve their cardiovascular health.
2. Frequent communication with participants and their families via telephone and during sessions will encourage them to attain all the session and thus inspire to develop healthy lifestyle. During each session we will note their progress, provide lesson on good nutrition, encourage them to continue adapting healthy eating habits such as eating at home, increase vegetables and fruits in serving per day, avoid frequent eating out in restaurant, cut down eating junk food and sugar contain drinks, . To further reinforce healthy lifestyle we will provide them healthy food coupons during each session and on completion will also give a mug stating "**Fight against obesity in Youth**". In addition, we will encourage our participant to involve in physical activity regularly if it is not contraindicated.
3. During each session we will assess participant's behavior and emotional problem with the help of PSY-questionnaires. If find any concern we will address them and take corrective measure to improve. This program will also help them to interact with not only staff but also with other participants and their families which will create a supportive and friendly environment.

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ПРОФІЛАКТИКА РИЗИКУ СЕРЦЕВО-СУДИННИХ ЗАХВОРЮВАНЬ У ПІДЛІТКІВ В СІЛЬСЬКИХ РЕГІОНАХ

Одна третина всіх смертей у світі відбувається від хвороб, пов'язаних із зайвою вагою і її наслідками, у тому числі від серцево-судинних захворювань і цукрового діабету 2-го типу (ЦД2). Отримані дані попередніх досліджень пов'язані з вивченням ендотеліальної дисфункції у підлітків з цукровим діабетом і ожирінням показали, що в умовах надмірної ваги робота серцево-судинної системи дівчат, є більш скомпromетованою у порівнянні з хлопцями. Дівчата мають також більш виражені психологічні проблеми, пов'язані з ожирінням. Ожиріння також веде до серйозних порушень під час вагітності і може створити метаболічно ненормальну внутрішньоутробну середовище, підвищений довічний ризик ожиріння і супутніх захворювань плоду. Таким чином, створюється порочне коло біологічних, поведінкових і психосоціальних впливів, що може прискорити розвиток пов'язаних з ожирінням захворювань і скоротити тривалість життя. Високий індекс маси тіла (ІМТ) у матері підвищує ризик розвитку макросомії плода і, таким чином, підвищує ризик народження в асфіксії навіть у доношених дітей. Якщо не вжити належних заходів, то наслідки цього глобального ожиріння на майбутні покоління будуть серйозними. Ми розробили освітню програму оздоровлення підлітків для складання довгострокового прогнозу їх здоров'я і профілактики захворювань серцево-судинної системи на основі правильного харчування, що відповідає віку фізичної активності в умовах розвинутого суспільства. Місія соціальної програми профілактики раннього ризику серцево-судинних захворювань: "Боротьба з ожирінням і цукровим діабетом другого типу 2 (ЦД2) в отрочстві (БОДО)" – переконати дітей, які страждають від надмірної ваги, ожиріння і ЦД2 та їхні сім'ї у доцільності ведення здорового способу життя. Ми розраховуємо на поліпшення здоров'я, благополуччя, і позитивні прогнози щодо здорового способу життя серед обстежуваних дітей в сільських регіонах. Основною метою програми є надання знань про стан серцево-судинної системи, стимулювання нашої молоді до адаптації здорового способу життя через залучення до цієї оздоровчої програми, уважне спостереження за реалізацією програми та за створенням "медичного будинку" для дітей, що страждають на ожиріння, з освітою та підтриманням психічного здоров'я. Учасники та їхні батьки отримують знання про ожиріння, профілактику хвороб, пов'язаних з ожирінням. Вони вчать робити відповідні кроки до здорового способу життя, запобігання серцево-судинних проблем, пов'язаних з ожирінням і цукровим діабетом другого типу 2. Усуваються також як поведінкові, емоційні проблеми, так і клінічні показники, такі, як артеріальний тиск, вага, ІМТ, вміст гемоглобіну А1с (HbA1c), і ліпідний профіль. Ми впевнені, що наш досвід буде корисним для розробки "дорожньої карти" покращення якості життя дітей з ризиком ССЗ. Реалізація програми стане гарним прикладом, що демонструє ефективність суспільної підтримки боротьби із захворюваннями ССЗ в сільських районах.

Ключові слова: ожиріння, діабет, серцево-судинні захворювання, підлітки, здоровий спосіб життя.

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