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The lowest is the safest value of plasma triglycerides

~ page 10

From the Editor

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This is the tenth issue this year that has various papers dealing with anemia, depression, community issues and leadership strategies.

Shati A did a retrospective study to explore the prevalence of anemia among children done in Muhayel, Aseer region which located at the southwestern of Saudi Arabia. The study population included all children aged 6 month to 59 month seen in emergency room (ER) and underwent sampling for complete blood count for whatever the reason. Hemoglobin level (Hb), mean corpuscular volume (MCV) and mean corpuscular hemoglobin (MCH) were taken. The study included 1,033 children aged between 6 and 59 months with a mean of 27.81 ± 13.9 months. More than half of them were males 683 (66.1%). The prevalence of anemia was 29.3%; mostly mild 254(24.6%) or moderate 48(4.6%). Severe anemia was observed only in 1 child representing 0.1% of the sample. Microcytic hypochromic anemia was observed among 36.0% of the study sample, based on the WHO cut of levels of MCV and MCH. The author concluded that anemia, particularly microcytic hypochromic anemia is relatively still a public health problem among children in Saudi Arabia, despite the improvement in socio-economic status. Further research is recommended for deep investigation of the underlying factors, particularly nutritional habits.

Ahmed N.A et al, attempt to evaluate the prevalence of depression in secondary schools students in Tikrit city. This is a descriptive study with analytic component carried out on secondary schools, students in Tikrit district. Questionnaire were presented to all students in the schools that day, in the classroom, depending on the help and cooperation of the school's administration and teachers during spare time. The students filled out the questionnaires after explanation of each item by the researcher in about 35 minutes and returned them to researcher at the end of the session. Study revealed that 31 (19.4%), 19 (11.9%) of males and 91(56.9%), 30 (18.8%) are of females were of moderate and high depression score. Study

revealed that 58 (25.1%), 23 (10%) of IDPS were of moderate and high depression score respectively as shown in table 2. Study revealed that 27 (23.3%), 13 (11.2%) of males IDPS were of moderate and high depression score respectively. Study revealed that 31 (27%), 10 (8.7%) of females IDPS were of moderate and high depression score respectively. The authors concluded that that 58 (25.1%), 23 (10%) of IDPS were of moderate and high depression score respectively. The current study has found that the prevalence of depression by using the Columbia scale among secondary schools students aged (12-18) in Tikrit district was 81 (35.1%) %. Gender of the students has a significant effect on the occurrence of depression which is more in female.

Obeid F.A et al looked at the correlation between systolic myocardial velocity (Sm) obtained by Tissue Doppler imaging (TDI) and left ventricular ejection fraction (LVEF) measured by conventional Simpson's method in patients with heart failure. This study involved 85 patients with heart failure whose LVEF < 50% (mean age 58 (11) years), LV EF measured by conventional Simpson's method correlating with average Sm measured at septal, lateral, anterior and inferior side of mitral annulus by tissue Doppler echocardiography. The mean age of the 85 patients in the study was 58.48(11) years. The mean LVEF was 33.53 (9.94). A significant correlation was detected between systolic mitral annulus velocity Sm and LV ejection fraction EF (R:0.609, p:0.000). LV mean Sm obtained by TDI is a parameter that is easily obtained and practical, can be used to evaluate LV systolic function in patients with HF. The authors concluded that the assessment of average systolic myocardial velocity (Sm) could be used as an alternative to LVEF. This approach may be useful especially when the image quality is poor and maintain high accuracy in prediction LV systolic dysfunction.

Helvacı M.R et al ; tried to understand the safest value of triglycerides in the plasma. The study included 669 cases (393 females), totaly. Mean age increased up to triglycerides value of 200 mg/dL, and there was an increase of triglycerides about 8.1 mg/dL for each year of aging. Male ratio increased parallel to increased triglycerides, gradually (32.3% versus 50.0%, p<0.001). Mean body mass indexes were 24.4, 27.0, 29.3, 29.9, and 30.1 kg/m² in the five groups, respectively, and it was normal only in cases with the plasma triglycerides values of lower than 60 mg/dL. Fasting plasma glucose, hypertension, diabetes mellitus, smoking, and chronic obstructive pulmonary disease increased parallel to increased triglycerides, gradually, whereas low density lipoproteins and white coat hypertension increased just up to triglycerides value of 200 mg/dL. The greatest number of deteriorations (seven components, significantly) was observed just during passage from the first into the second groups. They concluded that

Plasma triglycerides may actually be some acute phase reactants indicating disseminated endothelial damage, inflammation, fibrosis, and eventual atherosclerosis all over the body. There may be some significant relationships between plasma triglycerides and aging, excess weight, and smoking. The greatest number of deteriorations of components of metabolic syndrome were observed just above triglycerides value of 60 mg/dL.

Mansour, N et al; stressed that providing quality and cost-effective healthcare is a primary objective of healthcare systems globally. Published literature shows that healthcare quality is greatly dependent on the wellbeing of physicians; however, the latter has been scarcely reported among the key performance indicators (KPIs) of healthcare systems and perhaps has not received the needed attention from both healthcare systems and physicians. Recent literature reports that physicians' burnout rates and depression disorders have reached alarming levels that necessitate immediate attention and intervention by the healthcare systems at large. In parallel, there is growing evidence pertaining to the positive impact of developing leadership qualities, self-awareness, and embracing technology on physicians' wellbeing and overall performance. Such educational and training programs help them identify their personal and professional goals and eventually work towards achieving them. Thus, a Leadership Programs for Academic Physicians and Scientists (LeAPS) has been developed at the Faculty of Medicine and Medical Center at the American University of Beirut aiming at improving physicians' wellbeing through developing their self-awareness, augmented/artificial intelligence (AI) and leadership competencies.

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Prevalence of Anemia among Saudi children aged 6 months to 5 years in a low altitude Area, Aseer Region, Saudi Arabia

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Abstract

Background: Anemia among children represents a major public health problem all over the world, and particularly in developing countries. The aim of this study was to determine the magnitude of anemia in general, and microcytic hypochromic anemia in particular, among Saudi children aged 6 months to 5 years of age in Muhayel City and also to compare the prevalence according to children's age and gender.

Subjects and Methods: This was a retrospective study to explore the magnitude of anemia among children in Muhayel City, Aseer region which is located in the southwestern region of Saudi Arabia. The study was done in a government hospital. The study population included all children aged 6 months to 59 months seen in the emergency room (ER) and who underwent sampling for complete blood count for whatever the reason. Hemoglobin level (Hb), mean corpuscular volume (MCV) and mean corpuscular hemoglobin (MCH) were taken.

Results: The study included 1,033 children aged between 6 and 59 months with a mean of 27.81 ± 13.9 months. More than half of them were males 683 (66.1%). The prevalence of anemia was 29.3%; mostly mild 254 (24.6%) or moderate 48 (4.6%). Severe anemia was observed only in 1 child representing 0.1% of the sample. Microcytic hypochromic anemia was observed among 36.0% of the study sample, based on the WHO cut off levels of MCV and MCH.

Conclusion: Anemia, particularly microcytic hypochromic anemia is relatively still a public health problem among children in Saudi Arabia, despite the improvement in socio-economic status. Further research is recommended for deep investigation of the underlying factors, particularly nutritional habits.

Key words: anemia, microcytic, hypochromic, preschool, Saudi Arabia

Introduction

The World Health Organization report (1993-2005) revealed that children of preschool age represent 47.4% of anemic patients worldwide, [1] which represents a major public health problem all over the world, and in particular in developing countries.[1-3]

The most common cause of anemia is nutritional due to deficiency of some micronutrients such as iron, folate, vitamin B12, and protein.[4]

Most anemia cases develop gradually and progressively and are due to iron deficiency. In early childhood bad feeding habits, especially during the weaning period, exacerbate the problem. Anemia frequently develops as breast milk is replaced by foods that are poor in iron and other nutrients, including vitamin B12 and folic acid. Low oxygenation of brain tissues, a consequence of anemia, may lead to impaired cognitive function, growth and psychomotor development, especially in infants. Children under five years old and pregnant women have greater susceptibility to anemia because of their increased iron requirements due to rapid body growth and expansion of red blood cells.[5-8]

Preschool children have the highest risks of anemia as a result of their physiological vulnerability and greater liability of infection.[9] Iron deficiency is the main type of anemia among preschool children[10] and is primarily due to increased iron requirements as they grow.[11] Moreover, iron is likely to be inadequate in children's diets, particularly if parents are unaware of the need for iron intake.[5-12]

Anemia has adverse outcomes on the health of preschool children, including impacts on cognitive development, physical growth, immunity and school performance.[13,14]

As the prevalence of anemia in Saudi preschool children has not been recently studied and because of the rapid economic changes in the Kingdom of Saudi Arabia in socioeconomic and lifestyle of the Saudi community in recent decades, this study was carried out to determine the prevalence of anemia in preschool age children in Muhayel - a low altitude area- and also to compare the prevalence between different age groups; 6-23 months to 24-48 months and to 49-59 months, as well as to determine the prevalence of microcytic hypochromic anemia among the whole group based on MCV and MCH and for different subgroups.

Subjects and methods

This was a retrospective hospital record-based study done at Muhayel in Aseer region which is located at the southwestern region of Saudi Arabia. This study was done in the government hospital in the low altitude area. The study population included all children aged 6 months to 59 months seen in the emergency room (ER) between 1 January 2018 to 31 December 2018 and who underwent sampling for complete blood count for whatever the reason.

Exclusion criteria were all patients with sickle cell anemia, thalassemia, those with acute blood loss or hemolysis, and those with chronic diseases such as chronic kidney, liver diseases or chronic cyanosis.

Data about child age, sex and area of living were collected from the ER records which usually contain all personal data about patients and acute diagnosis and underlying disease if present. Hemoglobin level (Hb), mean corpuscular volume (MCV) and mean corpuscular hemoglobin (MCH) were taken. Hemoglobin of patients from high altitude areas were subtracted by 0.8 mg as per WHO recommendation.[15]

Normal values for hemoglobin was ≥ 11 gm/dl, 10-10.9 gm/dl was considered as mild anemia, 9.9- 7 gm/dl was considered moderate anemia and <7 gm/dl was regarded as severe anemia. Regarding MCV, low level was defined as the following: 6 months - 24 months < 70 ; 25 months - 48 months <73 and 49 - 59 months <75 and for MCH, low is defined as the following: 6 - 24 months <24 and 25 - 59 months < 25 .[15]

Results

This study utilized data from 1,033 Saudi children in the age group of 6-59 months across Muhayel City, Aseer Region of Saudi Arabia. From a total of 1,033 children, 683 (66.1%) of them were males and 350 (39.9%) were females as shown in Table 1.

Table 2 shows the demographic factors associated with anemia among the selected Saudi children for this study, in different age groups. From the 567 children 6-24 months, a number of 185 (32.6%) experienced mild anemia, 40 (7.1%) experienced moderate anemia and only 1 (0.2%) child experienced severe anemia.

Multivariate analysis showed the children between 25 months to 48 months of age had a lower risk of having anemia. A number of 60 children (16.1%) had mild anemia, 5 children (1.3%) had moderate anemia and none of them had severe anemia.

Children more than 48 months of age had the lowest risk of having anemia with 9 children (9.7%) who suffered mild anemia, 3 children (3.2%) who suffered moderate anemia and none suffered severe anemia.

Out of the 1,033 Saudi children 6-59 months of age, most of them did not have anemia (730 children, 70.66%), 254 (24.57%) children experienced mild anemia and 48 (4.64%) children had moderate anemia. Only 1 (0.09%) child suffered severe anemia.

In terms of gender, there were more male children who had anemia (683 males, 66.1%) compared to female children (350 females, 33.9%)

Figure 1 shows the prevalence of microcytic hypochromic anemia among the selected participants in Muhayel. A total of 620 children had microcytic anemia, 575 had hypochromic anemia, and 373 had microcytic hypochromic anemia.

Table 1: Demographic characteristics of the Saudi Children (participants)

Variables	Categories	Frequency	Percentage
Age (in months)	6-24	567	54.9
	25-48	373	36.1
	>48	93	9.0
Gender	Males	683	66.1
	Females	350	39.9

Table 2: Demographic factors associated with anemia among Saudi children 6-59 months in Muhayel, Aseer Region of Saudi Arabia. (N = 1,033)

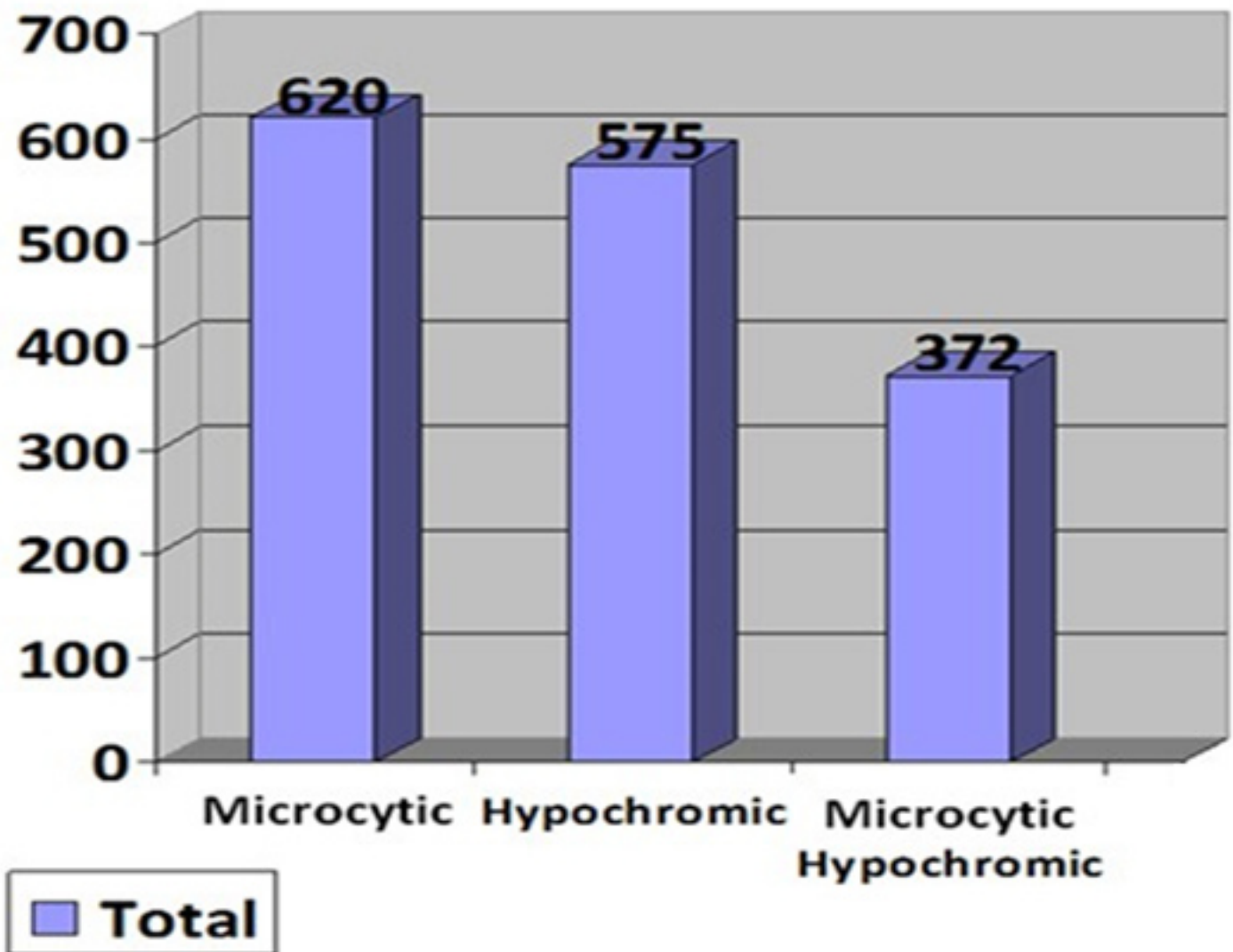
	Anemia*				χ^2 (p-value)
	No N = 730 N (%)	Mild N = 254 N (%)	Moderate N = 48 N (%)	Severe N = 1 N (%)	
Age in months					0.000
6-24 (n=1253)	341 (60.1)	185 (32.6)	40 (7.1)	1 (.2)	
25-48 (n=779)	308 (82.6)	60 (16.1)	5 (1.3)	0 (0)	
>48 (n=383)	81 (87.1)	9 (9.7)	3 (3.2)	0 (0)	
Gender					.764
Males (n=1446)	483 (70.7)	165 (24.2)	34 (5.0)	1 (0.1)	
Females (n=969)	247 (70.0)	89 (25.4)	14 (4.0)	0 (0.0)	

* Based on WHO hemoglobin concentration cut off levels

Table 3: Demographic factors associated with microcytic hypochromic anemia among children 6-59 months, Abha and Khamis Mushayt cities, Saudi Arabia. (N = 1,033)

	Microcytic hypochromic anemia*		χ^2 (p-value)
	Yes (N=661) (%)	No N= 372 (%)	
Age in months			.000
6-24 (n=1253)	238 (42.0)	329 (58.0)	
25-48 (n=779)	238 (30.3)	260 (69.7)	
>48 (n=383)	21 (22.6)	72 (77.4)	
Gender			.314
Males (n=1446)	250 (36.6)	433 (63.4)	
Females (n=969)	122 (34.9)	228 (65.1)	

Figure 1: Prevalence of microcytic hypochromic anemia among children 6-59 months in Muhayel City, Aseer Region of Saudi Arabia



Discussion

This study was undertaken to determine the magnitude of anemia among Saudi Arabia children aged 6 months to 5 years in Muhayel, Aseer Region of Saudi Arabia. Anemia was found among 29.33% of children. This is comparatively lower than the national prevalence which is 44% according to the EDHS findings in 2011.[16] Prevalence of anemia varied as reported from several developing countries. In 2008, it was 16.1% in the Philippines.[17] Another study in Tanzania showed it was 87%.[18] This level of prevalence is classified as a moderate public health problem according to the World Health Organization.[19] The observed magnitude of anemia in our study was lower than the estimated global anemia prevalence which is 47.4%.[20]

It is evident in this study that occurrence of anemia varied with age. The occurrence of anemia in children 6 months to 24 months is the highest. The magnitude of the problem in children aged 24 months and below may be associated with increased demand of iron due to fast growth, early

weaning and scarcity of foods rich in iron. Iron intake is also likely to improve with age as a result of more varied diet, including the introduction of food rich in iron.[21] These factors are usual in this age group. Neves who studied anemia in children 6-24 months of age in Belem, and Para in Brazil found a prevalence of 55.1%.[22] In this study, 226 (39.85%) children had anemia which is higher than in those aged 48 months and above (12 children, 12.90%). This result is similar to study findings conducted in Ethiopia (2007), Brazil (2010), and Bangladesh (2010).[23-25] Another study conducted by Magalhaes in Africa reported the same trend of anemia prevalence by age.[10]

The observed magnitude of anemia in this study decreased with children's age. It decreased among children aged 25 months to 48 months (65 out of 373, 17.42%). A study conducted in Nigeria had the same result. [26] This may be associated with lower iron requirements per kilogram of body weight related to decreasing growth rate and the shifting from complementary foods to table foods [17, 26, 27].

In this study one of the factors associated with anemia is the gender. More male children (66.1%) acquired anemia compared to female children (39.9%). Other authors also reported that anemia is more common in boys. [28 , 29] It may be because boys grow faster compared to girls which results in a high demand of iron that cannot be met by diet alone. A comparable observation was made in African countries like Ghana and Malawi.[30 - 32] Some authors found in their studies that there is no association between anemia and gender.[33 - 34] However, further studies are necessary to better understand the relationship between anemia and gender.

An important limitation of the present study is that the study population included children visiting the ER at a hospital. This may reduce the generalizability of the results. Nevertheless, results of this study can generate ideas to develop interventions that can combat anemia. The government should focus on providing information about adequate nutrition among children. The results emphasize the importance of evaluating the overall nutritional status of the participants. Interventions like iron supplementation and nutritional education should be encouraged to decrease the prevalence of anemia in children 6 months to 5 years of age.

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Conflicts of interest: none

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References

- De Benoist B, Erin McLean E, Egli I, Cogswell M. Worldwide prevalence of anaemia 1993-2005: WHO global database on anaemia. Geneva, World Health Organization, 2008.
- McLean E, Cogswell M, Egli I, Wojdyla D, de Benoist B. Worldwide prevalence of anaemia, WHO Vitamin and Mineral Nutrition Information System, 1993–2005. *Public Health Nutrition* 2009; 12:444-54.
- Galloway R. Anemia prevention and control: what works? Geneva, USAID/World Bank/PAHO-WHO/Micronutrient Initiative/FAO/UNICEF, 2003.
- Olivares M, Walter T, Hertrampf E, Pizarro F. Anaemia and iron deficiency disease in children. *Br Med Bull.* 1999;55(3):534-43.
- Rolo S, Morgado M. Anemia: terapêutica farmacológica. *Rev de la Ofil.* 2006; (16): 34-40
- Torres MA, Sato K, Queiroz SS. Anemia in children under 2 years in basic health care units in the State of São Paulo, Brazil]. *Rev Saúde Pública* 1994; 28(4): 290-4 Portuguese
- Walter T, de Andraca I, Chadud P, Perales CG. Iron deficiency anemia: adverse effects on infant psychomotor development. *Pediatrics.* 1989; 84(1): 7-17.
- Silva DG, Franceschini SC, Priore SE, Ribeiro SM, Szarfarc SC, Souza SB, et al. Anemia ferropriva em crianças de 6 a 12 meses atendidas na rede pública de saúde do município de Viçosa, Minas Gerais. *Rev Nutr.* 2002; 15(3): 301-8.
- McLean E, Cogswell M, Egli I, Wojdyla D, de Benoist B. Worldwide prevalence of anaemia, WHO Vitamin and Mineral Nutrition Information System, 1993–2005. *Public Health Nutrition* 2009; 12:444-54.
- Magalhães RJ, Clements AC. Mapping the risk of anaemia in preschool-age children: the contribution of malnutrition, malaria, and helminth infections in West Africa. *PLoS Medicine*, 2011;8:e1000438
- Milman N. Anemia - still a major health problem in many parts of the world! *Ann Hematol.* 2011;90(4):369-77.
- García-Casal MN Landaeta-Jiménez M, Puche R, Leets I, Carvajal Z, Patiño E, et al. A program of nutritional education in schools reduced the prevalence of iron deficiency in students. *Anemia*, 2011; 2011:284050.
- World Health Organization. Iron Deficiency Anaemia Assessment, Prevention and Control. A Guide for Programme Managers. Geneva: World Health Organization; 2001.
- Ezzati M, Lopez AD, Rodgers A, Vander Hoorn S, Murray CJ. Selected major risk factors and global and regional burden of disease. *Lancet.* 2002;360(9343):1347–60.
- WHO. Haemoglobin concentrations for the diagnosis of anaemia and assessment of severity. Vitamin and Mineral Nutrition Information System. Geneva, World Health Organization, 2011 (WHO/NMH/NHD/MNM/11.1) (<http://www.who.int/vmnis/indicators/haemoglobin>.)
- USAID. Anemia: Beyond Being Tired. Definitions, Prevention and Control, USAID, Washington, DC, USA, 2011.
- Tengco LW, Rayco-Solon P, Solon JA, Sarol Jr. JN, Solon FS. Determinants of anemia among preschool children in the Philippines. *Journal of the American College of Nutrition*, 2008; 27(2): 229–243.
- Bulletin of the World Health Organization. Anaemia in Tanzanian Children, 2003, 81.
- World Bank, Poverty and Income. The Poverty Group, 2004, <http://devdata.worldbank.org/hnpstats/pvd.asp>. Retrieved date: 27 October 2018.
- McLean E, M. Cogswell, Egli I, Wojdyla D, De Benoist B. Worldwide prevalence of anaemia, WHO Vitamin and Mineral Nutrition Information System, 1993–2005. *Public Health Nutrition*, 2009; 12(4): 444–454.
- Uddin MK, Sardar, MH. Hossain MZ, et al. Prevalence of anaemia in children of 6 months to 59 months in Narayanganj, Bangladesh, *Journal of Dhaka Medical College*, 2010; 19(2): 126–130.
- Neves MB, Silva EM, Moraes MB. Prevalence and factors associated with iron deficiency in infants treated at a primary care center in Belém, Pará, Brazil. *Cad Saúde Pública.* 2005; 21 (6): 1911-8 Portuguese
- Adish AA, Esrey SA, Gyorkos TW, Johns T. Risk factors for iron deficiency anaemia in preschool children in northern Ethiopia. *Public Health Nutrition*, 2007; 2: 243–252.

24. Oliveira DN, Martorell R, Nguyen P. Risk factors associated with hemoglobin levels and nutritional status among Brazilian children attending daycare centers in Sao Paulo city, Brazil," *Archivos Latinoamericanos de Nutrición*. 2010; 60(1): 23–29.
25. Leal LP, Filho MB, de Lira PIC, Figueiroa JN, Osório MM. Prevalence of anemia and associated factors in children aged 6–59 months in Pernambuco, Northeastern Brazil. *Revista de Saúde Pública*, 2011; 45(3): 457–466..
26. Onyemaobi GA, Ikoku A. Anaemia prevalence among under-five children in Imo State, Nigeria," *Australian Journal of Basic and Applied Sciences*, 2011; (5)2: 122–126.
27. Leal LP, Filho MB, de Lira PIC, Figueiroa JN, Osório MM. Prevalence of anemia and associated factors in children aged 6–59 months in Pernambuco, Northeastern Brazil. *Revista de Saúde Pública*, 2011; 45(3): 457–466.
28. Torres MA, Sato K, Queiroz SS. Anemia in children under 2 years in basic health care units in the State of São Paulo, Brazil. *Rev Saúde Pública* 1994; 28(4): 290-4 Portuguese
29. Oliveira RS, Diniz AS, Benigna MJ, Silva SM, Lola MM, Gonçalves MC, et al. Magnitude, distribuição espacial e tendência da anemia em pré-escolares da Paraíba. *Rev Saúde Pública*. 2002; 36(1): 26-32.
30. Owusu-Agyei S, Fryauff D, Chandramohan D, Koram K, Binka F, et al. (2002) Characteristics of severe anemia and its association with malaria in young children of the Kassena-Nankana district of northern Ghana. *Am J Trop Med Hyg* 67:371–377.
31. Brabin B, Premji Z, Verhoeff F (2001). An analysis of anemia and child mortality. *The J Nutr* 131:636S–648S.
32. Akhwale W, Lum J, Kaneko A, Eto H, Obonyo C, et al. Anemia and malaria at different altitudes in the western highlands of Kenya. *Acta Trop* 2004 ; 91:167–175.
33. Rocha DS, Lamounier JÁ, Capanema FD, Franceschini SC, Norton RC, Costa AB, et al. Estado nutricional e prevalência de anemia em crianças que frequentam creches em Belo Horizonte, Minas Gerais. *Rev Paul Pediatr*. 2008; 26(1): 6-13
34. Silva LS, Giugliani ER, Aerts DR. Prevalence and risk factors for anemia among children in Brazil. *Rev Saúde Pública*. 2001; 35(1): 66-73.

The lowest is the safest value of plasma triglycerides

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Abstract

Background: We tried to understand the safest value of triglycerides in the plasma.

Methods: Patients with plasma triglycerides values lower than 60 mg/dL were collected into the first, lower than 100 mg/dL into the second, lower than 150 mg/dL into the third, lower than 200 mg/dL into the fourth, and 200 mg/dL and greater into the fifth groups.

Results: The study included 669 cases (393 females), totally. Mean age increased up to triglycerides value of 200 mg/dL, and there was an increase of triglycerides about 8.1 mg/dL for each year of aging. Male ratio increased parallel to increased triglycerides, gradually (32.3% versus 50.0%, $p < 0.001$). Mean body mass indexes were 24.4, 27.0, 29.3, 29.9, and 30.1 kg/m² in the five groups, respectively, and it was normal only in cases with the plasma triglycerides values of lower than 60 mg/dL. Fasting plasma glucose, hypertension, diabetes mellitus, smoking, and chronic obstructive pulmonary disease increased parallel to increased triglycerides, gradually, whereas low density lipoproteins and white coat hypertension increased just up to triglycerides value of 200 mg/dL. The greatest number of deteriorations (seven components, significantly) was observed just during passage from the first into the second groups.

Conclusions: Plasma triglycerides may actually be some acute phase reactants indicating disseminated endothelial damage, inflammation, fibrosis, and eventual atherosclerosis all over the body. There may be some significant relationships between plasma triglycerides and aging, excess weight, and smoking. The greatest number of deteriorations of components of metabolic syndrome were observed just above triglycerides value of 60 mg/dL.

Key words: Triglycerides, acute phase reactants, smoking, excess weight, aging, chronic endothelial damage, accelerated atherosclerosis

Introduction

Chronic endothelial damage may be the most common type of vasculitis and the leading cause of aging and death in human beings (1-4). Much higher blood pressure (BP) of the afferent vasculature may be the major underlying cause by inducing recurrent injuries on endothelium, and probably whole afferent vasculature including capillaries are mainly involved in the process. Therefore the term of venosclerosis is not as famous as atherosclerosis in the literature. Secondary to the chronic endothelial damage, inflammation, edema, and fibrosis, vascular walls thicken, their lumens narrow, and they lose their elastic nature which reduces blood supply to terminal organs and increases systolic BP further. Some of the well-known components of the inflammatory process are physical inactivity, animal-rich diet, overweight, smoking, alcohol, hypertriglyceridemia, hyperbetalipoproteinemia, dyslipidemia, impaired fasting glucose, impaired glucose tolerance, white coat hypertension (WCH), and chronic inflammatory processes including rheumatologic disorders, chronic infections, and cancers. Some of the irreversible consequences of the chronic inflammatory process include obesity, hypertension (HT), diabetes mellitus (DM), cirrhosis, peripheral artery disease (PAD), chronic obstructive pulmonary disease (COPD), chronic renal disease (CRD), coronary heart disease (CHD), mesenteric ischemia, osteoporosis, and stroke (5-7). Although early withdrawal of the causative factors may delay terminal consequences, after development of cirrhosis, COPD, CRD, CHD, PAD, or stroke, endothelial changes cannot be reversed completely due to their fibrotic nature. The underlying causes and terminal consequences were researched under the titles of metabolic syndrome, aging syndrome, or accelerated endothelial damage syndrome in the medicine, extensively (8-11). Although its normal limits have not been determined clearly yet, higher plasma triglycerides may be significant indicators of the metabolic syndrome (12). Due to the strong association between higher plasma triglycerides and prevalence of CHD, Adult Treatment Panel (ATP) III adopts lower cutpoints for triglycerides abnormalities than did ATP II (13, 14). Although ATP II determined the normal triglycerides value as lower than 200 mg/dL in 1994, World Health Organisation in 1999 (15) and ATP III in 2001 reduced its normal limit as lower than 150 mg/dL (14). Although these cutpoints are usually used to define limits of the metabolic syndrome, there are suspicions about the safest upper limits of plasma triglycerides in the medical literature. Beside that, smoking may be found among one of the most common causes of vasculitis all over the world. It is a major risk factor for the development of atherosclerotic endpoints including CHD, PAD, COPD, cirrhosis, CRD, and stroke (16, 17). We tried to understand the safest value of plasma triglycerides according to some known components of the metabolic syndrome in the present study.

Material and Methods

Chronic endothelial damage may be the most common type of vasculitis and the leading cause of aging and death in human beings (1-4). Much higher blood pressure (BP) of the afferent vasculature may be the major underlying cause by inducing recurrent injuries on endothelium, and probably whole afferent vasculature including capillaries are mainly involved in the process. Therefore the term of venosclerosis is not as famous as atherosclerosis in the literature. Secondary to the chronic endothelial damage, inflammation, edema, and fibrosis, vascular walls thicken, their lumens narrow, and they lose their elastic nature which reduces blood supply to terminal organs and increases systolic BP further. Some of the well-known components of the inflammatory process are physical inactivity, animal-rich diet, overweight, smoking, alcohol, hypertriglyceridemia, hyperbetalipoproteinemia, dyslipidemia, impaired fasting glucose, impaired glucose tolerance, white coat hypertension (WCH), and chronic inflammatory processes including rheumatologic disorders, chronic infections, and cancers. Some of the irreversible consequences of the chronic inflammatory process include obesity, hypertension (HT), diabetes mellitus (DM), cirrhosis, peripheral artery disease (PAD), chronic obstructive pulmonary disease (COPD), chronic renal disease (CRD), coronary heart disease (CHD), mesenteric ischemia, osteoporosis, and stroke (5-7). Although early withdrawal of the causative factors may delay terminal consequences, after development of cirrhosis, COPD, CRD, CHD, PAD, or stroke, endothelial changes cannot be reversed completely due to their fibrotic nature. The underlying causes and terminal consequences were researched under the titles of metabolic syndrome, aging syndrome, or accelerated endothelial damage syndrome in the medicine, extensively (8-11). Although its normal limits have not been determined clearly yet, higher plasma triglycerides may be significant indicators of the metabolic syndrome (12). Due to the strong association between higher plasma triglycerides and prevalence of CHD, Adult Treatment Panel (ATP) III adopts lower cutpoints for triglycerides abnormalities than did ATP II (13, 14). Although ATP II determined the normal triglycerides value as lower than 200 mg/dL in 1994, World Health Organisation in 1999 (15) and ATP III in 2001 reduced its normal limit as lower than 150 mg/dL (14). Although these cutpoints are usually used to define limits of the metabolic syndrome, there are suspicions about the safest upper limits of plasma triglycerides in the medical literature. Beside that, smoking may be found among one of the most common causes of vasculitis all over the world. It is a major risk factor for the development of atherosclerotic endpoints including CHD, PAD, COPD, cirrhosis, CRD, and stroke (16, 17). We tried to understand the safest value of plasma triglycerides according to some known components of the metabolic syndrome in the present study.

Results

The study included 669 cases (393 females and 276 males), totally. The mean values of plasma triglycerides were 51.0, 78.2, 121.8, 174.7, and 301.7 mg/dL in the five groups, respectively. The mean age increased just up to the plasma triglycerides value of 200 mg/dL, and there was an increase of triglycerides, about 8.1 mg/dL for each year of aging up to the plasma triglycerides value of 200 mg/dL. Male ratio increased parallel to the increased plasma triglycerides values, gradually (32.3% versus 50.0%, $p < 0.001$). BMI increased just up to the plasma triglycerides value of 150 mg/dL, significantly. Beside that the mean BMI values were 24.4, 27.0, 29.3, 29.9, and 30.1 kg/m² in the five study groups, respectively. In other words, only the cases with the plasma triglycerides values of lower than 60 mg/dL had a normal mean BMI value. FPG, HT, DM, and COPD increased parallel to the increased plasma triglycerides values, gradually whereas LDL and WCH increased just up to the plasma triglycerides value of 200 mg/dL. Prevalence of smoking increased parallel to the increased plasma triglycerides values, gradually (16.9% versus 39.1%, $p < 0.001$). Interestingly, the most significant increase of smoking was seen just after the plasma triglycerides value of 200 mg/dL, and there was not any significant effect of aging or excess weight on these patients. On the other hand, the greatest number of deteriorations (seven components, significantly) was observed during passage from the first into the second groups of the study cases. Whereas just six components deteriorated during passage from the second into the third groups, significantly. Three components deteriorated during passage from the third into the fourth, and four components deteriorated during passage from the fourth into the last groups, significantly (Table 1).

Discussion

Excess weight may lead to both structural and functional abnormalities of many organ systems in the body. Adipose tissue produces leptin, tumor necrosis factor- α , plasminogen activator inhibitor-1, and adiponectin-like cytokines which act as acute phase reactants in the plasma (22, 23). Excess weight-induced chronic low-grade vascular endothelial inflammation may play a significant role in the pathogenesis of accelerated atherosclerotic process all over the body (1, 2). Additionally, excess weight may cause an increased blood volume as well as an increased cardiac output thought to be the result of increased oxygen need of the excessive fat tissue. The prolonged increase in the blood volume may lead to myocardial hypertrophy terminating with a decreased cardiac compliance. Beside that, the prevalence of high FPG and total cholesterol and low high density lipoproteins (HDL) increased parallel to the higher values of BMI (24). Combination of these cardiovascular risk factors will eventually terminate with an increase in left ventricular stroke work, higher risks of arrhythmias, cardiac failure, and sudden cardiac death. Similarly, the prevalence of CHD and stroke increased parallel to the higher BMI values in another study (25), and risk of death from all causes including cancers increased

throughout the range of moderate to severe weight excess in all age groups (26). The relationships between excess weight and increased BP and plasma triglycerides values were described in the metabolic syndrome (12), and clinical manifestations of the syndrome included obesity, dyslipidemia, HT, insulin resistance, and proinflammatory and prothrombotic states (10). Similarly, prevalence of smoking (42.2% versus 28.4%, $p < 0.01$), excess weight (83.6% versus 70.6%, $p < 0.01$), DM (16.3% versus 10.3%, $p < 0.05$), and HT (23.2% versus 11.2%, $p < 0.001$) were all higher in the hypertriglyceridemia group in another study (27). On the other hand, the prevalence of hyperbeta lipoproteinemia were similar both in the hypertriglyceridemia (200 mg/dL or higher) and control groups (18.9% versus 16.3%, $p > 0.05$, respectively) in the above study (27). Similarly, plasma LDL values increased, just up to the plasma triglycerides value of 200 mg/dL in the present study. Beside that, the mean BMI values increased just up to the plasma triglycerides value of 150 mg/dL, significantly ($p < 0.05$ for each step).

Smoking causes a chronic inflammatory process on the vascular endothelium, particularly on the respiratory tract and lungs, terminating with an accelerated atherosclerosis, end-organ insufficiencies, early aging, and premature death. Therefore smoking should be accepted as one of the major components of the metabolic syndrome. Strong and irreversible atherosclerotic effects of smoking are the most obviously observed in Buerger's disease. It is an obliterative vasculitis characterized by inflammatory changes in the small and medium-sized arteries and veins, and it has never been reported in the absence of smoking in medicine. Beside the strong and irreversible atherosclerotic effects of smoking, smoking in humans and nicotine administration in animals may be associated with a decreased BMI (28). Evidence revealed an increased energy expenditure during smoking both on rest and light physical activity (29), and nicotine supplied by patch after smoking cessation decreased caloric intake in a dose-related manner (30). According to an animal study, nicotine may lengthen intermeal time and simultaneously decrease amount of meal eaten (31). Additionally, BMI seems to be the highest in former and the lowest in current smokers (32). Smoking may be associated with a postcessation weight gain (33). Similarly, although CHD was detected with similar prevalence in both genders in a previous study (34), prevalence of smoking and COPD were higher in males against the higher mean values or prevalence of the BMI, LDL, triglycerides, WCH, HT, and DM in females with CHD. This result may indicate both the strong atherosclerotic and weight decreasing roles of smoking (35). Similarly, the incidence of myocardial infarction is increased six-fold in women and three-fold in men who smoke 20 cigarettes per day (36). In another definition, smoking is more dangerous for women probably due to the associated higher BMI and its consequences in them. Parallel to the above results, the proportion of smokers is consistently higher in men in the literature (19). So smoking is probably a powerful atherosclerotic risk factor with some suppressor effects on appetite. Smoking-induced weight loss may be related with the smoking-induced vascular endothelial inflammation all over the body, since loss of appetite is one of the major

Table 1: Characteristics features of the study cases according to plasma values of triglycerides

Variable	Lower than 60 mg/dL	p-value	Lower than 100 mg/dL	p-value	Lower than 150 mg/dL	p-value	Lower than 200 mg/dL	p-value	200 mg/dL or higher
Number of cases	65		158		188		110		148
Age (year)	<u>36.1 ± 16.6</u> (17-79)	<u>0.011</u>	<u>41.9 ± 17.0</u> (16-83)	<u>0.001</u>	<u>47.1 ± 15.0</u> (16-82)	<u>0.005</u>	<u>51.3 ± 12.0</u> (19-73)	Ns*	<u>49.5 ± 11.6</u> (21-86)
Male ratio	<u>32.3%</u>	Ns	<u>36.0%</u>	Ns	<u>40.4%</u>	Ns	<u>43.6%</u>	Ns	<u>50.0%</u>
Smoking	<u>16.9%</u>	Ns	<u>18.3%</u>	<u>0.05</u> >	<u>25.0%</u>	Ns	<u>24.5%</u>	<u>0.001</u> >	<u>39.1%</u>
BMI† (kg/m ²)	<u>24.4 ± 4.5</u> (16.7-38.1)	<u>0.003</u>	<u>27.0 ± 5.9</u> (16.7-49.3)	<u>0.000</u>	<u>29.3 ± 6.0</u> (18.4-50.5)	Ns	<u>29.9 ± 4.8</u> (19.2-49.0)	Ns	<u>30.1 ± 5.1</u> (21.0-51.1)
FPG‡ (mg/dL)	<u>98.5 ± 39.6</u> (77-377)	Ns	<u>107.1 ± 52.0</u> (59-400)	Ns	<u>104.7 ± 31.9</u> (71-327)	<u>0.029</u>	<u>116.2 ± 48.5</u> (68-386)	Ns	<u>122.0 ± 49.1</u> (74-338)
Triglycerides (mg/dL)	<u>51.0 ± 7.7</u> (27-59)	<u>0.000</u>	<u>78.2 ± 11.1</u> (60-99)	<u>0.000</u>	<u>121.8 ± 14.9</u> (100-149)	<u>0.000</u>	<u>174.7 ± 14.8</u> (150-199)	<u>0.000</u>	<u>301.7 ± 108.7</u> (200-1.144)
LDL§ (mg/dL)	<u>99.5 ± 23.4</u> (56-161)	<u>0.02</u>	<u>114.4 ± 34.1</u> (43-269)	<u>0.021</u>	<u>132.5 ± 31.2</u> (64-228)	Ns	<u>138.8 ± 29.9</u> (50-210)	Ns	<u>129.9 ± 38.7</u> (10-239)
WCH	<u>16.9%</u>	<u>0.01</u> >	<u>25.3%</u>	Ns	<u>30.8%</u>	Ns	<u>34.5%</u>	Ns	<u>33.7%</u>
HT**	<u>6.1%</u>	<u>0.001</u> >	<u>12.6%</u>	<u>0.01</u> >	<u>20.7%</u>	Ns	<u>23.6%</u>	Ns	<u>24.3%</u>
DM***	<u>3.0%</u>	<u>0.001</u> >	<u>10.7%</u>	Ns	<u>13.2%</u>	Ns	<u>16.3%</u>	<u>0.01</u> >	<u>25.6%</u>
COPD****	<u>6.1%</u>	Ns	<u>9.4%</u>	Ns	<u>12.7%</u>	Ns	<u>13.6%</u>	<u>0.01</u> >	<u>22.9%</u>
Number of deteriorations		<u>7</u>		<u>6</u>		<u>3</u>			<u>4</u>

*Nonsignificant (p>0.05) †Body mass index ‡Fasting plasma glucose §Low density lipoproteins || White coat hypertension **Hypertension ***Diabetes mellitus ****Chronic obstructive pulmonary disease

symptoms of disseminated inflammations in the body. Physicians can even understand healing of patients via their normalizing appetite. Several toxic substances found in cigarette smoke get into the circulation by means of the respiratory tract, and cause a vascular endothelial inflammation until their clearance from the circulation. But due to the repeated smoking habit of the individuals, the clearance process never terminates. So the patients become ill with loss of appetite, permanently. In another explanation, smoking-induced weight loss is an indicator of being ill instead of being healthy (30-32). After smoking cessation, normal appetite comes back with a prominent weight gain in the patients but the returned weight is their physiological weight, actually.

Although the obvious consequences of excess weight on health, nearly three-quarters of cases above the age of 30 years have excess weight (37). The prevalence of excess weight increases by decades, particularly after the third decade, up to the eighth decade of life (37). So 30th and 70th years of age may be the breaking points of life for weight, and aging may be the major determiner factor of excess weight. Probably, partially decreased physical and mental stresses after the age of 30 years and debility and comorbid disorders-induced restrictions after the age of 70 years may be the major causes for the changes of BMI at these ages. Interestingly, the mean age and BMI increased just up to the plasma triglycerides values of 200 mg/dL and 150 mg/dL, respectively, in the present study. So smoking remained the major causative factor for the hypertriglyceridemia after the plasma triglycerides values of 200 mg/dL. Beside that the mean BMI values were 24.4, 27.0, 29.3, 29.9, and 30.1 kg/m² in the five study groups, respectively. In other words, only the cases with the plasma triglycerides values of lower than 60 mg/dL had a normal mean BMI value. On the other hand, the mean age and triglycerides value of the first group were 36.1 years and 51.0 mg/dL, respectively. They were 41.9 years and 78.2 mg/dL in the second, 47.1 years and 121.8 mg/dL in the third, and 51.3 years and 174.7 mg/dL in the fourth groups, respectively. In another definition, the triglycerides values increased about 8.1 mg/dL for each year of aging up to 200 mg/dL in the plasma. So aging alone may be another risk factor for chronic low-grade inflammation on vascular endothelium all over the body. In this way, we may estimate the approximate age of patients by using their plasma triglycerides values below 200 mg/dL in the absence of any comorbid disorder or smoking.

Although ATP III reduced the normal border of plasma triglycerides as lower than 150 mg/dL in 2001 (14), whether or not much lower limits provide additional benefits for health is unclear. In the present study, prevalence of smoking was the highest in the highest triglycerides having group which may also indicate inflammatory roles of smoking in the metabolic syndrome, since triglycerides may actually be some acute phase reactants in the plasma. The mean FPG and BMI and prevalence of HT, DM, and COPD increased parallel to the plasma triglycerides values from the first up to the last groups, gradually. As one of our opinions, significantly elevated mean age by the increased

plasma triglycerides values may be secondary to aging-induced decreased physical and mental stresses, which eventually terminates with onset of excess weight and its consequences. Interestingly, although the mean age increased from the lowest triglycerides having group up to the triglycerides value of 200 mg/dL, it then decreased. The similar trend was also seen with the mean LDL value. These trends may be due to the fact that although the borderline high triglycerides values (150-199 mg/dL) is seen together with physical inactivity and overweight, the high triglycerides (200-499 mg/dL) and very high triglycerides values (500 mg/dL and higher) may be secondary to both genetic factors, smoking, and terminal consequences of the metabolic syndrome including obesity, DM, HT, COPD, cirrhosis, CRD, PAD, CHD, and stroke (14). But although the underlying causes of the high and very high plasma triglycerides values may be a little bit different, probably risks of the terminal endpoints of the metabolic syndrome do not change in them. For example, prevalence of HT, DM, and COPD were the highest in the highest triglycerides having group in the present study. Eventually, although some authors reported that lipid assessment can be simplified by measurements of total cholesterol and HDL (38), the present study and most of the others indicated a causal relationship between higher triglycerides and terminal consequences of the metabolic syndrome (39).

As a conclusion, plasma triglycerides may actually be some acute phase reactants indicating disseminated endothelial damage, inflammation, fibrosis, and eventual atherosclerosis all over the body. There may be some significant relationships between plasma triglycerides values and aging, excess weight, and smoking. Interestingly, the greatest number of deteriorations of components of the metabolic syndrome including mean age, BMI, triglycerides, LDL, WCH, HT, DM was observed just above the plasma triglycerides value of 60 mg/dL.

References

1. Widlansky ME, Gokce N, Keaney JF Jr, Vita JA. The clinical implications of endothelial dysfunction. *J Am Coll Cardiol* 2003; 42(7): 1149–1160.
2. Ridker PM. High-sensitivity C-reactive protein: potential adjunct for global risk assessment in the primary prevention of cardiovascular disease. *Circulation* 2001; 103(13): 1813–1818.
3. Helvacı MR, Seyhanlı M. What a high prevalence of white coat hypertension in society! *Intern Med* 2006; 45(10): 671-674.
4. Helvacı MR, Kaya H, Seyhanlı M, Cosar E. White coat hypertension is associated with a greater all-cause mortality. *J Health Sci* 2007; 53(2): 156-160.
5. Helvacı MR, Kaya H, Yalcin A, Kuvandik G. Prevalence of white coat hypertension in underweight and overweight subjects. *Int Heart J* 2007; 48(5): 605-613.
6. Helvacı MR, Kaya H, Duru M, Yalcin A. What is the relationship between white coat hypertension and dyslipidemia? *Int Heart J* 2008; 49(1): 87-93.

7. Helvacı MR, Kaya H, Sevinc A, Camci C. Body weight and white coat hypertension. *Pak J Med Sci* 2009; 25(6): 916-921.
8. Eckel RH, Grundy SM, Zimmet PZ. The metabolic syndrome. *Lancet* 2005; 365(9468): 1415-1428.
9. Grundy SM, Brewer HB Jr, Cleeman JI, Smith SC Jr, Lenfant C. Definition of metabolic syndrome: Report of the National Heart, Lung, and Blood Institute/American Heart Association conference on scientific issues related to definition. *Circulation* 2004; 109(3): 433-438.
10. Tonkin AM. The metabolic syndrome(s)? *Curr Atheroscler Rep* 2004; 6(3): 165-166.
11. Franklin SS, Barboza MG, Pio JR, Wong ND. Blood pressure categories, hypertensive subtypes, and the metabolic syndrome. *J Hypertens* 2006; 24(10): 2009-2016.
12. Helvacı MR, Kaya H, Gundogdu M. Association of increased triglyceride levels in metabolic syndrome with coronary artery disease. *Pak J Med Sci* 2010; 26(3): 667-672.
13. National Cholesterol Education Program. Second Report of the Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults (Adult Treatment Panel II). *Circulation* 1994; 89(3): 1333-1445.
14. Third Report of the National Cholesterol Education Program (NCEP) Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults (Adult Treatment Panel III) final report. *Circulation* 2002; 106(25): 3143-3421.
15. World Health Organization. Definition, Diagnosis and Classification of Diabetes Mellitus and its Complications. Report of a WHO consultation 1999.
16. Helvacı MR, Aydin Y, Gundogdu M. Smoking induced atherosclerosis in cancers. *HealthMED* 2012; 6(11): 3744-3749.
17. Fodor JG, Tzerovska R, Dorner T, Rieder A. Do we diagnose and treat coronary heart disease differently in men and women? *Wien Med Wochenschr* 2004; 154(17-18): 423-425.
18. Helvacı MR, Kaya H, Borazan A, Ozer C, Seyhanli M, Yalcin A. Metformin and parameters of physical health. *Intern Med* 2008; 47(8): 697-703.
19. Helvacı MR, Aydin Y, Varan G, Abyad A, Pocock L. Acarbose versus metformin in the treatment of metabolic syndrome. *World Family Med* 2018; 16(5): 10-15.
20. O'Brien E, Asmar R, Beilin L, Imai Y, Mallion JM, Mancia G, et al. European Society of Hypertension recommendations for conventional, ambulatory and home blood pressure measurement. *J Hypertens* 2003; 21(5): 821-848.
21. Vestbo J, Hurd SS, Agustí AG, Jones PW, Vogelmeier C, Anzueto A, et al. Global strategy for the diagnosis, management, and prevention of chronic obstructive pulmonary disease: GOLD executive summary. *Am J Respir Crit Care Med* 2013; 187(4): 347-65.
22. Funahashi T, Nakamura T, Shimomura I, Maeda K, Kuriyama H, Takahashi M, et al. Role of adipocytokines on the pathogenesis of atherosclerosis in visceral obesity. *Intern Med* 1999; 38(2): 202-206.
23. Yudkin JS, Stehouwer CD, Emeis JJ, Coppack SW. C-reactive protein in healthy subjects: associations with obesity, insulin resistance, and endothelial dysfunction: a potential role for cytokines originating from adipose tissue? *Arterioscler Thromb Vasc Biol* 1999; 19(4): 972-978.
24. Zhou B, Wu Y, Yang J, Li Y, Zhang H, Zhao L. Overweight is an independent risk factor for cardiovascular disease in Chinese populations. *Obes Rev* 2002; 3(3): 147-156.
25. Zhou BF. Effect of body mass index on all-cause mortality and incidence of cardiovascular diseases--report for meta-analysis of prospective studies open optimal cut-off points of body mass index in Chinese adults. *Biomed Environ Sci* 2002; 15(3): 245-252.
26. Calle EE, Thun MJ, Petrelli JM, Rodriguez C, Heath CW Jr. Body-mass index and mortality in a prospective cohort of U.S. adults. *N Engl J Med* 1999; 341(15): 1097-1105.
27. Helvacı MR, Aydin LY, Maden E, Aydin Y. What is the relationship between hypertriglyceridemia and smoking? *Middle East J Age and Ageing* 2011; 8(6).
28. Grunberg NE, Greenwood MR, Collins F, Epstein LH, Hatsukami D, Niaura R, et al. National working conference on smoking and body weight. Task Force 1: Mechanisms relevant to the relations between cigarette smoking and body weight. *Health Psychol* 1992; 11: 4-9.
29. Walker JF, Collins LC, Rowell PP, Goldsmith LJ, Moffatt RJ, Stamford BA. The effect of smoking on energy expenditure and plasma catecholamine and nicotine levels during light physical activity. *Nicotine Tob Res* 1999; 1(4): 365-370.
30. Hughes JR, Hatsukami DK. Effects of three doses of transdermal nicotine on post-cessation eating, hunger and weight. *J Subst Abuse* 1997; 9: 151-159.
31. Miyata G, Meguid MM, Varma M, Fetisov SO, Kim HJ. Nicotine alters the usual reciprocity between meal size and meal number in female rat. *Physiol Behav* 2001; 74(1-2): 169-176.
32. Laaksonen M, Rahkonen O, Prattala R. Smoking status and relative weight by educational level in Finland, 1978-1995. *Prev Med* 1998; 27(3): 431-437.
33. Froom P, Melamed S, Benbassat J. Smoking cessation and weight gain. *J Fam Pract* 1998; 46(6): 460-464.
34. Helvacı MR, Kaya H, Gundogdu M. Gender differences in coronary heart disease in Turkey. *Pak J Med Sci* 2012; 28(1): 40-44.
35. Helvacı MR, Aydin Y, Gundogdu M. Atherosclerotic effects of smoking and excess weight. *J Obes Wt Loss Ther* 2012; 2: 145.
36. Prescott E, Hippe M, Schnohr P, Hein HO, Vestbo J. Smoking and risk of myocardial infarction in women and men: longitudinal population study. *BMJ* 1998; 316(7137): 1043-1047.
37. Helvacı MR, Kaya H, Ozer C. Aging may be the major determiner factor of excess weight. *Middle East J Age and Ageing* 2008; 5(2).
38. Di Angelantonio E, Sarwar N, Perry P, Kaptoge S, Ray KK, Thompson A, et al. Major lipids, apolipoproteins, and risk of vascular disease. *JAMA* 2009; 302(18): 1993-2000.
39. Sarwar N, Sandhu MS, Ricketts SL, Butterworth AS, Di Angelantonio E, Boekholdt SM, et al. Triglyceride-mediated pathways and coronary disease: collaborative analysis of 101 studies. *Lancet* 2010; 375(9726): 1634-1639.

Epidemiology of Depression Among Internally Displaced Secondary School Students in Tikrit

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Abstract

Introduction: Depression is one of the most common and important diseases that may affect each person's lifetime all over the world. Depression may present as a chronic or recurrent type and affects all patient's daily life activities, personal, and social functions and may end with suicide. Depression affects all ages, genders, and populations. Depression can affect the whole body, and begins with mood, feelings, thinking, and behaviors. In general depression may affect 5% of the population at any time and affects females twice as much as males in adolescence. Depression in the adolescent period has unique characteristics because of its association with major personality changes, identity separation from parents, gender appearance, sexuality, and early decision making. This research aims at evaluating the prevalence of depression in secondary school students in Tikrit city.

Subjects and methods: This is a study in pediatric, and public health nursing and all ethical and administrative agreements were undertaken to conduct the study, from the Ministry of Education, and Department of education in the Tikrit Education Directorate. This is a descriptive study with an analytic component carried out on secondary school students in Tikrit district. A questionnaire was presented to all students in the schools in the classroom, on one day, depending on the help and cooperation of the school's administration and teachers during spare time. The students filled out the questionnaires in about 35 minutes after explanation of each item by the researcher and returned them to the researcher at the end of the session.

Results: The study revealed that 31 (19.4%), 19 (11.9%) of males and 91(56.9%), 30 (18.8%) are of females were of moderate and high depression score respectively. The study further revealed that 58 (25.1%), 23 (10%) of Internally Displaced Students (IDPS) were of moderate and high depression score respectively as shown in Table 2. The study revealed that 27 (23.3%), 13 (11.2%) of male IDPS were of moderate and high depression score respectively. The study also revealed that 31 (27%), 10 (8.7%) of females IDPS were of moderate and high depression score respectively.

Conclusions: The study revealed that 58 (25.1%), 23 (10%) of IDPS were of moderate and high depression score respectively. The current study found that the prevalence of depression by using the Columbia scale among secondary schools students aged (12-18) in Tikrit district was 81 (35.1%) %. Gender of the students has a significant effect on the occurrence of depression which is more in females.

Key words: IDPS student, Depression, Epidemiology of Depression in IDPS in Tikrit

Introduction

One of the common psychiatric diseases is depression, which is usually a disabling disorder that influences a patient's work, study, family, pattern of sleeping and eating habits, general wellbeing and ability to enjoy life. [1-2] Depression affects 7-18% of all people at least one time in their lives, before 40 years of age (3). According to the United Nations High Commission for Refugees (UNHCR) IDPs are persons obliged to leave their homes but not to cross an international border (.). The psychosocial factors which might be affected by displacement, and which pose a negative influence on mental health, are the following; social participation and support, and feeling of powerlessness (5).

There is a higher depression rate for IDPS who fled toward socially and culturally distinct communities and who try to adapt to the new social situation after migration (6). The specifics of IDPS status indicate a particular vulnerability to psychological distress because the movement between different cultures is a source of risk for psychological difficulty in any case. The displaced persons usually have a history of exposure to trauma, and are suspended between a frightening past and an uncertain future (7). Depression is one of four most prevalent psychological reactions reported in displaced persons [8, 9].

Displaced persons have a complex state, because displacement in itself is a risk factor for depression, in addition to the trauma of the events that cause additional stressors that unfold and persist afterwards [10-12]. In addition to material and administrative hardships such as little access to social and medical services, bad living circumstances, repair or replacement of lost or damaged possessions, difficult processes of application for aid from governmental organisations, and difficulty finding employment, the loss of social networks and support, and routines of normal life can severely add to the displacement burden as social, economic, and psychological factors. Many researchers have found that post-disaster stressors may be a common cause of depression in populations affected by disaster [13,14] and, commonly, have associated stressful life conditions with depression [15,16].

The development of mental health problems including depression following displacement and traumatic events may vary depending not only on affected individuals' characteristics but also on their communities and especially community social cohesion. [17-20]. Community Social cohesion represents the bonding between the person and their communities, these attachments may be demonstrated in feelings of belonging, willingness and ability to cooperate, and shared values among community members [21]. A few researchers, have found a relation between living in communities of high social cohesion and a lower risk of developing mental health disorders such as depression [22-24]. The aim of the study is to evaluate the prevalence rate of depression in secondary school students in Tikrit district. Suicide attempts and ideation form

a dangerous public health disorder in adolescents. Suicide represents the third highest cause of death in adolescents between the ages of 10-24, standing for 12% of all reported deaths in this age group in 2005 in the United States. [25] Recent evidence indicates that adolescent suicide may be increasing. In addition to adolescent suicide deaths, suicide ideation and attempts in adolescents represent major problems with greater prevalence. [26]

Patients and methods

The study was conducted at secondary schools in Tikrit district. A representative sample of 231 students aged 12-18 were assessed and asked to answer the questionnaire that included demographic information, family history of depression and if they are displaced, using the Columbia depression scale (DISC) of -22- items.

A formal administrative approval sheet was taken to conduct the study from the Ministry of Education, Department of Education in Tikrit Education Directorate. The study was carried out in the secondary schools in Tikrit District. This was a descriptive study with analytic component carried out on secondary schools, students in Tikrit district. Questionnaires were presented to all students in the classrooms in the schools that day, depending on the help and cooperation of the school's administration and teachers during spare time. The students filled out the questionnaires in about 35 minutes after explanation of each item by the researcher and returned them to the researcher at the end of the session.

Results

Study revealed that 58 (25.1%), 23 (10%) of IDPS were of moderate and high depression score respectively as shown in Table 1 and this shows that 81 (35.1%) were very likely to develop depression.

The study revealed that 27 (23.3%), 13 (11.2%) of male IDPS were of moderate and high depression score respectively and that 31 (27%), 10 (8.7%) of female IDPS were of moderate and high depression score respectively as shown in Table 2. This shows that 41 (35.7%) of IDPS females were very likely to develop depression in comparison to 40 (34.5%) of male IDPS who were of moderate and high depression score respectively

Suicidal thoughts were found in 29 (12.6%) of IDPs and suicidal attempts were found in 50 (21.6%) of IDPs. In the current study, 22% of IDPS students had history of suicidal attempt with another 13% who had history of suicidal ideation.

Table 1: Depression score among IDPS

Depression score	IDPs No. (%)
Weak	74 (32%)
Mild	76 (32.9%)
Moderate	58 (25.1%)
High	23 (10%)
Total	231 (100%)

Table 2. Depression scores in IDPS according to gender

Depression score	Male IDPs No (%)	Female IDPs No (%)
Weak	40 (34.5%)	34 (29.6%)
Mild	36 (31%)	40 (34.8%)
Moderate	27 (23.3%)	31 (27%)
High	13 (11.2%)	10 (8.7%)
Total	116 (100%)	115 (100%)

Discussion

In 2014, Iraq suffered from invasion and occupation of a terrorist organization to Iraqi governorates which obliged millions of people to be displaced to other nearby unaffected cities. This big population mass suddenly lost their houses and livelihoods and were either in camps or lived in a miserable situation in the cities. This put extra burden on the Iraqis who lived for more than 2 decades, in a vicious circle of sanctions, wars, and displacement which influenced all life, and health aspects of children, women, and adolescents. [27-28].

The mental and psychological diseases usually occur gradually following interaction of multiple factors as conflicts and violence, continuous stresses, environmental factors and internal psychogenic factors that contain Internalizing factors (fear of new situations, sadness, self underestimation, hopelessness, unhappiness, many worries, seeming to have less fun); and Externalizing factors (unnecessary risky behaviours, ignoring rules, misunderstanding feelings of others, fights with other children, teased by others, blame others for troubles, refuse to share) (29). Iraq already had very serious problems due to severe deficiencies in mental and psychological health care services (30-31). This study revealed that 81 (35.1%) of IDPS students were very likely to develop depression and this is higher than what was found by a study in Tikrit with the same scale, who found that (14.9%) had depression. The mass displacement and associated loss of family members and relatives and loss of houses and possessions may explain the condition (27).

This is even higher than the Mirela Grgić study which was conducted five years after they had experienced traumas of war, where 17.9% of displaced children ages 12-15 manifested clinically significant depression (32). This means that 41 (35.7%) of IDPS females were very likely to develop depression in comparison to 40 (34.5%) of male IDPS who were of moderate and high depression score respectively, which shows a small female predominance. In the current study, female to male ratio is lower than the Hassen AJ study who found that the ratio was (1.3:1), and this may be explained by long duration of displacement and persistent stress (27). The results of the current study are still lower than a study carried out in Turkish immigrants, which revealed a prevalence rate of depression of 36.1% in females and 27.9% in males) (33).

References

- 1- Gelder Michael, Harrison Paul & Cowen Philip : shorter Oxford textbook of Psychiatry , 5th ed. Oxford University press (2006), chapter 11:218
- 2- Rush AJ. The varied clinical presentations of major depressive disorder The Journal of clinical psychiatry, 2007; 68 (8); 4–10.
- 3- Kessler R., Gonagle K., Zhao S. Lifetime and 12-month prevalence of DSM-III-R psychiatric disorders in the United States: results from the National Co morbidity Survey. Gen Psychiatry, 1994, 11,227.
- 4- KALIN, G. “Guiding Principles on Internal Displacement. Annotations.” The American Society of International Law & The Brookings Institute Project on Internal Displacement. Studies in Transnational Legal Policy, 2000, No. 32.
- 5- Mallett R, Leff J, Bhugra D, Pang D, Zhao JH. Social environment, ethnicity and schizophrenia. A case-control study. Socio Psychiatry Epidemiol 2002;1 37:329-35.
- 6- Oppedal B, Roysamb E. Mental health, life stress and social support among young Norwegian adolescents with immigrant and host national background, Scand Psychology journal 2004; 45(10); 131-44.
- 7- Ainslie, R. Cultural mourning, immigration, and engagement: Vignettes from the Mexican Experience. In Suarez-Orozco Crossings: Mexican Immigration in Interdisciplinary perspective, 1998: 283-300.
- 8- Turner SW, Gorst-Unsworth C. Psychological sequelae of torture. A descriptive model. BrJPsychiatry1990; 157: 475–80
- 9- Turner SW, Bowie C, Dunn G, Shapo L, Yule W. Mental health of Kosovan Albanian refugees in the UK. Br J Psychiatry 2003; 182: 444-8.
- 10- Porter M, Haslam N. Predisplacement and post-displacement factors associated with mental health of refugees and internally displaced persons: a meta-analysis. JAMA. 2005; 294(5):602-12
- 11- Uscher-Pines L. Health effects of relocation following disaster: a systematic review of the literature. Disasters. 2009; 33(1):1–22.
- 12- Radanovic-Grguric L, Barkic J, Filakovic P, Koic O, Laufer D, Petek A, Mandic N. The impact of displacement on the expression of depressive disorder and social functioning among the war refugees. Psychiatria Danubina. 2009; 21(4):474-82.
- 13- Person C, Tracy M, Galea S. Risk factors for depression after a disaster. J Nerv Ment Dis. 2006; 194(9):659–666.
- 14- Tracy M, Norris FH, Galea S. Differences in the determinants of posttraumatic stress disorder and depression after a mass traumatic event. Depress Anxiety. 2011; 28(8):666-75.
- 15- Kendler KS, Karkowski LM, Prescott CA. Causal relationship between stressful life events and the onset of major depression. Am J Psychiatry. 1999; 156(6):837-41.
- 16 - Kessler RC. The effects of stressful life events on depression. Annu Rev Psychol. 1997; 48:191-214.
- 17- Kaplan GA. What is the role of the social environment in understanding inequalities in health? Ann N Y Acad Sci. 1999; 896:116–9.
- 18 - Ajdukovic D. Social contexts of trauma and healing. Med Confl Surviv. 2004; 20(2):120-35.
- 19- Galea S, Hadley C, Rudenstine S. Social context and the health consequences of disasters. Am J Disaster Med. 2006; 1(1):37-47.
- 20- Kawachi I, Subramanian SV. Measuring and modeling the social and geographic context of trauma: a multilevel modeling approach. J Trauma Stress. 2006; 19 (2): 195-203.
- 21- Norris FH, Stevens SP, Pfefferbaum B, Wyche KF, Pfefferbaum RL. Community resilience as a metaphor, theory, set of capacities, and strategy for disaster readiness. Am J Community Psychol. 2008; 41(1, 2):127-150.

- 22- Council of Europe. Concerted development of social cohesion indicators: Methodological guide. France: Council of Europe, Strasbourg; 2005.
- 23- Johns LE, Aiello AE, Cheng C, Galea S, Koenen KC, Uddin M. Neighborhood social cohesion and posttraumatic stress disorder in a community-based sample: findings from the Detroit Neighborhood Health Study. *Soc Psychiatry Psychiatr Epidemiol*. 2012
- 24- Kawachi I, Berkman LF. Social ties and mental health. *J Urban Health* 2001; 78 (3): 458-67.
- 24- Mair C, Diez Roux AV, Galea S. Are neighbourhood characteristics associated with depressive symptoms? A review of evidence. *J Epidemiol Community Health*. 2008; 62(11):940-54.
- 25- Centers for Disease Control and Prevention. Youth risk behavior surveillance -US, 2007. *Surveillance Summaries*, June 6, 2008. *Morbidity and Mortality Weekly Report*. 2008; 57(SS-4)
- 26- Bridge JA, Greenhouse JB, Weldon AH, Campo JV, Kelleher KJ. Suicide trends among youths aged 10-19 years in the United States, 1996-2005. *Journal of the American Medical Association*. 2008; 300:1025-6.
- 27- Ahmed J Hassen, Ashoor R Sarhat, Nashwan N Hanna. Depression among Secondary Schools Students in Tikrit District. *Indian Journal of Forensic Medicine & Toxicology* 2019;13 (2):
- 28- Faiadh H. Faiadh, Ashoor R. Sarhat. Screening of Post Traumatic Stress Disorders among Preschools Children in Baijее City. *Diyala Journal for Pure Science* 2010; 6 (3):1-15.
- 29- Nashwan N. Hanna, Ashoor R. Sarhat, Mohammad K. Abdulwahd. Screening of Psychosocial Problems among Secondary School Students in Alhawyja City. *Tikrit Medical Journal* 2009; 15 (1): 287-95. Second Scientific Conference
- 30- Sarhat AR, Abdulrahman ZN, Abedalrahman SK, Zardawy Islam AR. A Novel Case Series of Munchausen Syndrome by Proxy Victim. *World Family Medicine/Middle East Journal of Family Medicine* 2019; 17 (7):17-21.
- 31-Ashoor R Sarhat. Munchausen's syndrome by proxy in Iraq; case series. *Medical Journal of Tikrit* 2016;21 (1): 271-284.
- 32-Mirela Grgi, Silva SoldoButkovi:Depression And Perceived Family Functioning . In *Croatian Displaced Children.C.E.E.O.L. Social Research Journal for General Social Issues* 2005:603.
- 33-Bhui K, Abdi A, Abdi M, Pereira S, Dualeh M, Robertson D, Sathyamoorthy G, Ismail H. Traumatic events, migration characteristics and psychiatric symptoms among Somali refugees-preliminary communication. *Social Psychiatry and Psychiatric Epidemiology*. 2003;38:35-43.

Is there a Relation between Left Ventricular Ejection Fraction by conventional Simpson's method and Systolic Myocardial Velocity by Tissue Doppler in Heart Failure Patients?

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Abstract

Background: Heart failure is a condition of high morbidity and mortality and its incidence is increasing with the aging of the population. Echocardiography parameters have been shown to correlate well with left ventricular (LV) systolic function.

Aim: This study sought the correlation between systolic myocardial velocity (Sm) obtained by Tissue Doppler imaging (TDI) and left ventricular ejection fraction (LVEF) measured by conventional Simpson's method in patients with heart failure.

Method: This study involved 85 patients with heart failure whose LVEF < 50% (mean age 58 (11) years), with LV EF measured by conventional Simpson's method correlating with average Sm measured at septal, lateral, anterior and inferior side of mitral annulus by tissue Doppler echocardiography.

Results: The mean age of the 85 patients in the study was 58.48 (11) years, with 11 (12.9 %) female; 74 (87.1%) male. The mean LVEF was 33.53 (9.94). A significant correlation was detected between systolic mitral annulus velocity Sm and LV ejection fraction EF (R: 0.609, p: 0.000). LV mean Sm obtained by TDI is a parameter that is easily obtained and practical, and can be used to evaluate LV systolic function in patients with HF.

Conclusion: The assessment of average systolic myocardial velocity (Sm) could be used as an alternative to LVEF. This approach may be useful especially when the image quality is poor and maintains high accuracy in prediction of LV systolic dysfunction.

Key words: Systolic function, myocardial velocities, ejection, fraction

Background

Heart failure is a condition of high morbidity and mortality and its incidence is increasing with the aging of the population(1). Left ventricular ejection fraction (LVEF) is the most widely used index to assess cardiac function in clinical studies(2). This is especially due to the lack of an ideal measure of cardiac contractility, as its measurement and understanding are relatively easy, LVEF has remained the most commonly used index. Although LVEF measurement has some prognostic value in certain situations, it is influenced by preload, post load, heart rate, myocardial contractility and dyssynchrony (2).

The distribution of myocardial fibers is not uniform throughout the LV wall. The bundles of subendocardial and subpericardial muscles are arranged longitudinally, while the fibers located in the middle of the wall are aligned circumferentially. This group of muscle fibers is primarily responsible for LV radial axis contraction (3). On the other hand, the longitudinal contraction of the cardiac muscles plays an important role in the pump function of the ventricles(4,5). As the fibers of the longitudinal axis at the heart base correspond to the atrioventricular ring, changes in the longitudinal axis can be measured by the movement of the atrioventricular ring(3).

Longitudinal systolic function of the myocardium can now be evaluated by tissue Doppler imaging (TDI). TDI is a new echocardiography technique that enables the evaluation of the global and regional LV longitudinal functions by the analysis of systolic and diastolic myocardial velocities obtained from mitral annuli and is not affected by the quality of the images or the geometric shapes of the left ventricle (6,7). In recent years, systolic myocardial velocity (Sm) obtained by TDI has been suggested to be an alternative method in the assessment of systolic myocardial functions of various cardiac diseases(8-15) and a cutoff value of (S') greater than 7.5 cm/s had a sensitivity of 79% and a specificity of 88% in predicting normal global function of LV(13).

Objective

The objective of this study was to see whether the assessment of myocardial systolic velocity Sm (average) can be used as an alternative to ejection fraction obtained by Simpson's method. The advantage of this approach is that Sm is not dependent on image quality and therefore could apply to subjects with poor image quality.

Patients and methods

The study enrolled 85 patients with heart failure who presented to Algamhouria Teaching Hospital and private clinic between January 2016 and July 2017 with signs and symptoms matching the European Society of Cardiology Clinical Practice Guidelines for Heart Failure(16). The study was approved by the local ethics committee Faculty of Medicine and Health Sciences, University of Aden (REC-31-2018).

Resting ECGs of the patients were obtained and echocardiographic examinations were performed on all patients. Exclusion criteria included inadequate visualization, severe renal failure, congenital heart disease, cor pulmonale, atrial fibrillation pacemaker and valvular diseases, LVEF \geq 50%.

Echocardiography evaluation

All echocardiography examinations were performed by an experienced cardiologist using standard protocol, using ALPINUN medical system E-CUPE 9 echocardiography machine with a 3.5 MHz transducer. Echocardiographic parameters were measured according to the American Society of Echocardiography(17). Values for each parameter were obtained by one examiner averaging measurements from three successive cardiac cycles. Left ventricular ejection fraction was measured by 2D echocardiography obtained by modified Simpson's method from apical four-chambers view. Pulsed-wave TDI was performed by activating the TDI function in the same echocardiographic system. A 3.5 mm sample volume was used. In the apical four-chamber view, the TDI cursor was placed at the septal and lateral side of the mitral annulus in such a way that the annulus moved along the sample volume line. In the apical two-chamber view, the TDI cursor was placed at the anterior and inferior side of the mitral annulus in the same manner. Sm was measured at each segment and final LV mean Sm value was represented as the average of four sites (Figure1).

Statistical analyses

Data were analyzed using the Statistical Package for the Social Sciences version 20 for Windows statistical software program (SPSS, Chicago, USA). Numeric variables were expressed as mean (\pm SD). Category variables were expressed as percentage. The Pearson correlation coefficient was used for analysis of linear correlation between variables. A P-value $<$ 0.05 was considered statistically significant.

Results

The mean age of the 85 patients in the study was 58.48 (11) years, 11 (12.9 %) female; 74 (87.1%) male. Of these patients, 56 (65.9%) were hypertensive, 37 (43.6%) were diabetic, 70 (82.4%) had a history of CAD and 61 (71.8%) had dyslipidemia. The mean LVEF was 33.53 (9.94).

Demographic characteristics, 2D echocardiography and TDI parameters for the patients with HF are given in Table 1.

LVEF and Sm values were found to be lower in patients with HF, a stronger correlation was detected between LVEF and Sm ($R = 0.609$, $P < 0.0001$) (Figure 2). The time required to obtain LV average Sm was shorter than the time required calculating LVEF by Simpson's method.

Figure 1: Recording of myocardial velocities by TDI from mitral annuli

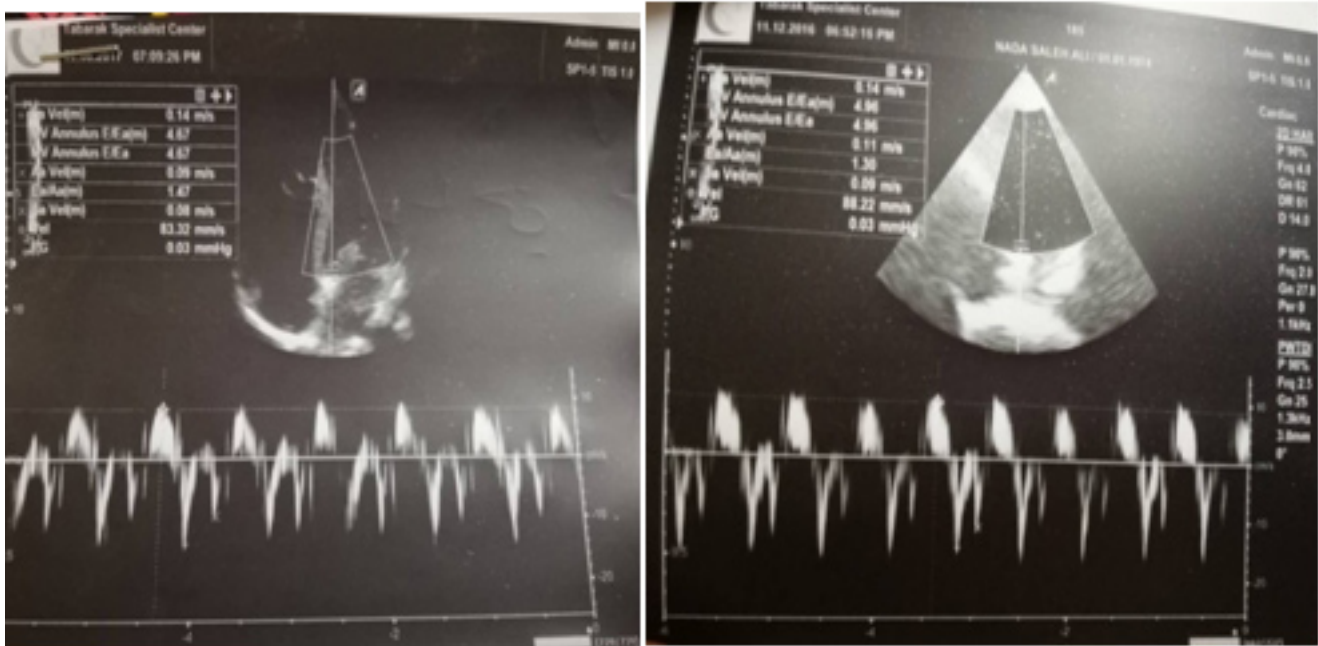
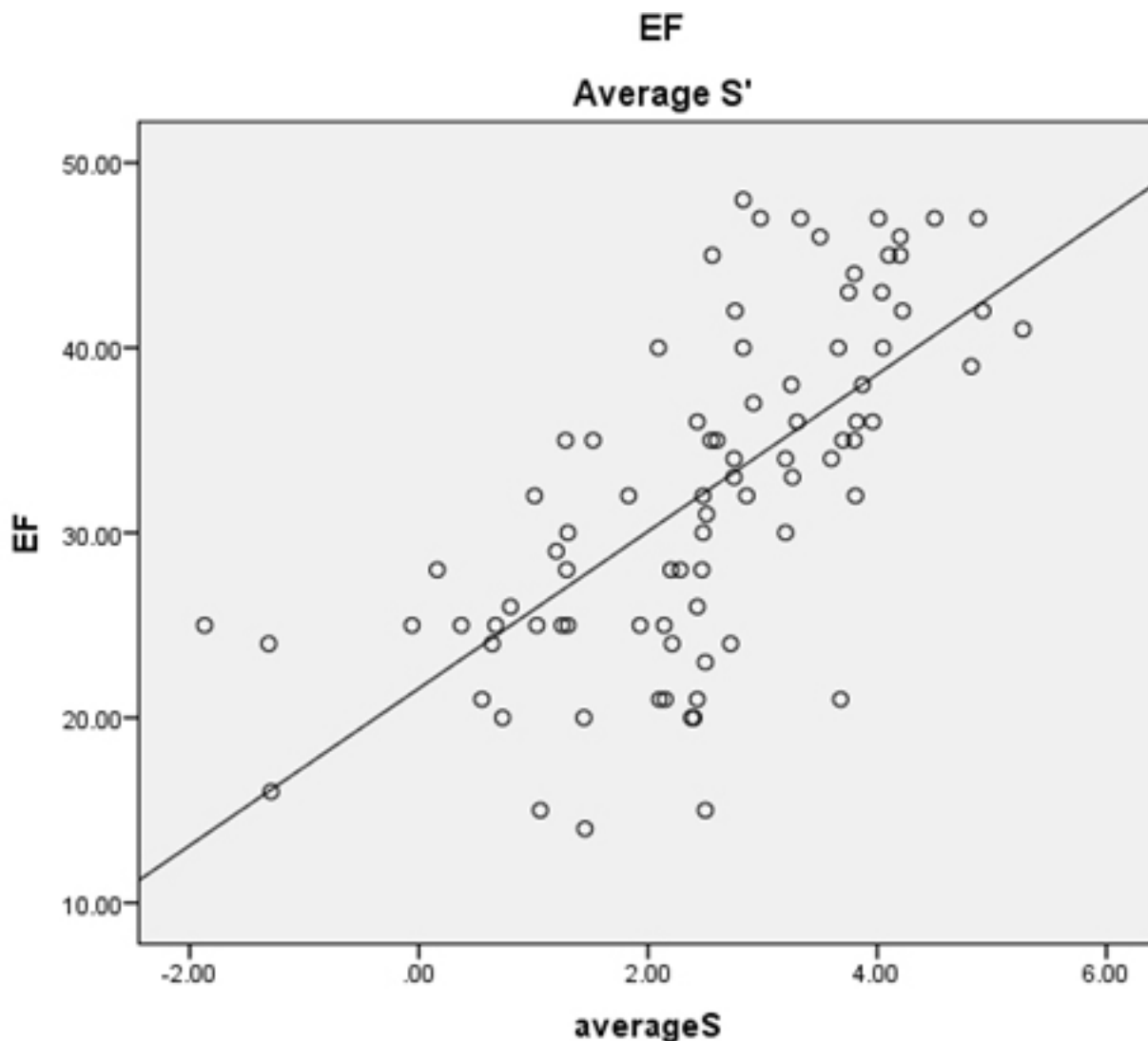


Table 1: Demographics and Echocardiography Data

Variables	Study sample (n = 85)
Age (years)	58.48 (11)
Males	74 (87%)
Females	11 (12.9%)
Cause of heart failure	
Ischemic	70 (82.4 %)
Non-ischemic	15 (17.6 %)
HT	56 (65.9%)
DM	37 (43.6%)
Dyslipidemia	61 (71.8%)
LV ejection fraction	33.53 (9.94)
LV average Sm (cm/s)	2.67 (1.43)

HT = hypertension; DM = diabetes mellitus; LVEF = left ventricular ejection fraction.

Figure 2: Correlation between LV average Sm and LVEF in patients with heart failure.
 LVEF = left ventricular ejection fraction; Sm = systolic myocardial velocity



Discussion

This study is the first of its kind in Yemen that evaluates the relation between EF and Sm or the prediction of EF by Sm in patients with heart failure. Spectral TDI could be used as an alternative examination when EF is difficult to assess due to poor image. The study demonstrated a simple quantitative approach to predicting EF using Sm (average) from spectral TDI.

This study found a strong correlation between the two parameters EF and Sm in patients with HF. In daily clinical practice, LV systolic function are mostly evaluated by ejection fraction, which is calculated according to modified Simpson's method, but this method is largely dependent on the quality of images and LV geometric shapes and is therefore technically difficult in patients with poor image quality. TDI method is clinically useful due to the minimal dependency of Sm on the image quality. In contrast, EF demonstrates strong dependency on the visibility of the endocardial contour when using Simpson's method and reported to be impossible in an about half of the patients

with acute myocardial infarction due to poor image quality(18). Moreover, the calculation of LVEF by this method is time consuming and has a high inter and intra-observer variability (19).

The longitudinal contraction of the cardiac muscles plays an important role in the pump function of the ventricles (4, 5). Longitudinal systolic function of myocardium can now be evaluated by TDI. TDI is a recent technique that allows better assessment of regional and global LV functions by the quantification of myocardial velocities, thereby providing a new way of assessing LV function (20). Assessment of cardiac function by TDI may be more sensitive than traditional methods (6,7). Thus, Sm obtained by TDI has been suggested to be an alternative method in recent years in the assessment of systolic myocardial functions of various cardiac diseases (8-15). In the studies so far, it has been demonstrated that in mixed groups, there has been an agreement between Sm derived from PWD-TDI or color Mmode TDI and LVEF obtained by radionuclide or echocardiographic Simpson's method (8,15).

In the studies conducted in patients with HF, a strong correlation was found between Sm and LVEF (21, 22). A study done by Duzenli et al, including a large number of patients, evaluated the correlation between LVEF derived by modified Simpson's method and Sm obtained by TDI, found a strong correlation in patients with HF (23).

It was reported that in patients with HF, it has been shown that Sm is decreased in parallel to LVEF (24,25). In HF circumferential dysfunction, as well as longitudinal myocardial dysfunction, can account for the strong correlation between Sm and LVEF in these patients.

The result of this study suggests that in patients with HF in whom the measurement of LVEF is suboptimal because of poor acoustic windows and distorted LV geometry, Sm may be a valuable parameter to select an optimal therapy (pharmacological therapy, cardioverter-defibrillator implantation, etc).

The findings from this study suggest that since Sm is not affected by the quality of the images or geometric shape and is more practical, it can be an alternative parameter to EF in identifying patients with abnormal LV systolic function in patients with HF.

Limitation

One important limitation of this study was that the results were not valid for patients with preserved EF and normal subject. Another limitation was the lack of subgroups with atrial fibrillation, conduction abnormalities, pacemakers and prosthetic valves, therefore we could not make any inferences about these specific conditions.

Conclusion

LV myocardial systolic velocities Sm (average) obtained by TDI, a parameter that is easily obtained and practical, can be used to evaluate LV systolic function in patients with HF. The prediction of EF by Sm (average) is a simple method and not time consuming.

References

1. Kannel, W.B. Belanger, A.J. Epidemiology of heart failure. *Am Heart J* 1991; 121 (3 Pt 1): 951-57.
2. Sanderson JE, Fraser AG. Systolic dysfunction in heart failure with a normal ejection fraction: echo-Doppler measurements. *Progr Cardiovasc Dis.* 2006; 49 (3): 196-206.
3. Alam M, Wardell J, Andersson E, Samad BA, Nordlander R. Effects of first myocardial infarction on left ventricle systolic and diastolic function with the use of mitral annular velocity determined by pulse-wave Doppler tissue imaging. *J Am Soc Echocardiogr.* 2000; 13 (5): 343-52.
4. Lundback S: Cardiac pumping and function of the ventricular septum. *Acta Physiol Scand Suppl* 1986;550:1-101.
5. Jones CJ, Raposo L, Gibson DG: Functional importance of the long axis dynamics of the human left ventricle. *Br Heart J* 1990;63:215-220.
6. Waggoner AD, Bierig SM: Tissue Doppler imaging: a useful echocardiographic method for the cardiac sonographer to assess systolic and diastolic ventricular function. *J Am Soc Echocardiogr* 2001;14:1143-1152.
7. Sutherland GR, Bijmens B, McDicken WN: Tissue Doppler echocardiography. Historical perspective and technological considerations. *Echocardiography* 1999;16:445-453.
8. Gulati VK, Katz WE, Follansbee WP, et al: Mitral annular descent velocity by tissue Doppler echocardiography as an index of global left ventricular function. *Am J Cardiol* 1996;77:979-984.
9. Nagueh SF, Bachinski LL, Meyer D, et al: Tissue Doppler imaging consistently detects myocardial abnormalities in patients with hypertrophic cardiomyopathy and provides a novel means for an early diagnosis before and independently of hypertrophy. *Circulation* 2001;104:128-130.
10. Wandt B, Fornander Y, Egerlid R: Maximal longitudinal contraction velocity in assessment of left ventricular systolic function: a pulsed tissue Doppler and M-mode study. *Echocardiography* 2004;21:587-592.
11. Arques S, Roux E, Sbragia P et al: Accuracy of tissue Doppler echocardiography in the diagnosis of new onset congestive heart failure in patients with levels of B-type natriuretic peptide in the midrange and normal left ventricular ejection fraction. *Echocardiography* 2006;23:627-634.
12. D'Andrea A, D'Andrea L, Caso P et al: The usefulness of Doppler myocardial imaging in the study of the athlete's heart and in the differential diagnosis between physiological and pathological ventricular hypertrophy. *Echocardiography* 2006;23:149-157.
13. Saxena N, Rajagopalan N, Edelman K, et al: Tricuspid annular systolic velocity: a useful measurement in determining right ventricular systolic function regardless of pulmonary artery pressures. *Echocardiography* 2006;23:750-755.
14. Duzenli MA, Ozdemir K, Soylu A, et al: The effect of isolated left bundle branch block on the myocardial velocities and myocardial performance index. *Echocardiography* 2008;25:256-263.
15. Vinereanu D, Lim PO, Frenneaux MP, et al: Reduced myocardial velocities of left ventricular long axis contraction identify both systolic and diastolic heart failure—a comparison with brain natriuretic peptide. *Eur J Heart Fail* 2005;7:512-519.
16. Swedberg K, Cleland J, dargie H, Drexler H, Follath F, Komajda M, et al. Guidelines for the diagnosis and treatment of chronic heart failure: Executive summary (update 2005): The Task Force for the diagnosis and Treatment of Chronic Heart Failure of the European Society of Cardiology. *Eur Heart J* 2005; 26:1115-40.
17. Schiller NB, Shah PM, Crawford M, et al. Recommendations for quantitation of the left ventricle by two-dimensional echocardiography. American Society of echocardiography Committee on standards, Subcommittee on Quantitation of two-dimensional echocardiograms. *J Am Soc Echocardiogr* 1989;2:358-67.

18. Jensen-Urstad K, Bouvier F, Hojer J, et al: Comparison of different echocardiographic methods with radionuclide imaging for measuring left ventricular ejection fraction during acute myocardial infarction treated by thrombolytic therapy. *Am J Cardiol* 1998;81:538–544.
19. ACC/AHA practice guidelines. ACC/AHA guidelines for clinical application of echocardiography. *Circulation* 1997;95:1686–1774.
20. Yu CM, Sanderson JE, Marwick TH, et al: Tissue Doppler imaging a new prognosticator for cardiovascular diseases. *J Am Coll Cardiol* 2007;49:1903–1914.
21. Fukuda K, Oki T, Tabata T, et al: Regional left ventricular wall motion abnormalities in myocardial infarction and mitral annular descent velocities studied with pulsed tissue Doppler imaging. *J Am Soc Echocardiogr* 1998;11:841–848.
22. Alam M, Wardell J, Andersson E, et al: Assessment of left ventricular function using mitral annular velocities in patients with congestive heart failure with or without the presence of significant mitral regurgitation. *J Am Soc Echocardiogr* 2003;16:240–245.
23. Mehmet A. Duzenli, K. et al: Relationship between Systolic Myocardial Velocity Obtained by Tissue Doppler Imaging and left ventricular ejection fraction: systolic myocardial velocity predicts the degree of left ventricular dysfunction in heart failure. *A jrn. of CV Ultrasound* 2008;25:856-863.
24. Wang M, Yip GW, Wang AY, et al: Peak early diastolic mitral annulus velocity by tissue Doppler imaging adds independent and incremental prognostic value. *J Am Coll Cardiol* 2003;41:820–826.
25. Nikitin NP, Loh PH, Silva R, et al: Prognostic value of systolic mitral annular velocity measured with Doppler tissue imaging in patients with chronic heart failure caused by left ventricular systolic dysfunction. *Heart* 2006;92:775–779.

The Role of Self-Awareness, Augmented Artificial Intelligence and Enhanced Leadership Competencies in Developing Future Academic Physicians

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Abstract

Providing quality and cost-effective healthcare is a primary objective of healthcare systems globally. Published literature shows that healthcare quality is greatly dependent on the wellbeing of physicians; however, the latter has been scarcely reported among the key performance indicators (KPIs) of healthcare systems and perhaps has not received the needed attention from both healthcare systems and physicians. Recent literature reports that physicians' burnout rates and depression disorders have reached alarming levels that necessitate immediate attention and intervention by the healthcare systems at large. In parallel, there is growing evidence pertaining to the positive impact of developing leadership qualities, self-awareness, and embracing technology on physicians' wellbeing and overall performance. Such educational and training programs help them identify their personal and professional goals and eventually work towards achieving them.

Thus, Leadership Programs for Academic Physicians and Scientists (LeAPS) has been developed at the Faculty of Medicine and Medical Center at the American University of Beirut aiming at improving physicians' wellbeing through developing their self-awareness, augmented/artificial intelligence (AI) and leadership competencies.

Key words: Augmented/Artificial Intelligence, Self-awareness, Leadership, Academic Physician Well-being, Burnout

Introduction

Emotional intelligence was introduced by Goleman (1995) to include five dimensions: self-awareness, self-management, self-motivation, empathy, and social skills. This concept has been amply discussed in the literature, tackling physicians' competencies, partly referred to as interpersonal skills (Patterson et al. 2000, Sexson et al. 2001, Epstein & Hundert 2002, Randall et al. 2006). Emotional intelligence stands out among the supporting competencies that contribute to academic physicians' success in performing their tripartite functions effectively (Daouk-Öry et al. 2017). On the other hand, Dyrbye et al. (2017), Dhingra et al. (2016), and Dyrbye & Shanafelt (2011) reported that physicians' burnout stems, generally, from work-related factors and inveterate stress at work, and tends to negatively affect their empathy score and their patients' satisfaction; whereas, Scheepers et al. (2015) confirmed the positive relationship between physicians' well-being, patient satisfaction, and other interpersonal facets of patient care. Goleman (1995) suggested that better self-awareness and self-management helps individuals be in better control of their emotions and feelings, and thus develop coping skills to support others rather than avoiding them (Smith 2007). Moreover, Ekman & Krasner (2017) highlighted the presence of an inverse relationship between burnout and empathy, as burnout and stress significantly contribute towards and negatively affect empathy. An empirical study (Daouk-Öry et al. 2017) revealed – in more than one area – the need for developing leadership, empathy, and many other soft skills among physicians in order to succeed in their academic career. Decety & Meyer (2008) dissected the components and definition of empathy to include sharing emotions without losing oneself in the other's experience, which resembles an introduction to burnout and stress. Ekman & Krasner (2017), Dhingra et al. (2016), Hutchinson (2013), and Orzech et al. (2009) suggested educating and training physicians on certain skills that can help them empathize and avoid burnout. These suggested topics include self-awareness, emotional awareness, communication skills, intensive mindful training on anxiety, self-compassion and attention; and have been reported to enhance physicians' well-being and resilience and reduce depression indicators.

The American University of Beirut Faculty of Medicine and Medical Center (FM-AUBMC) is a non-profit organization that provides education, research, and patient-care services mainly to the people of Lebanon and the Middle East region. It employs 379 academic physicians and scientists (106 females (28%) with a median age of 44 years; 273 males (72%) with a median age of 53 years). In 2010, a new in-house intelligent web-based faculty management information system (FMIS) was introduced (Rahal Alameh & Mansour, 2010), aimed to provide faculty members and leadership with real-time information, services, reports, metrics, and a platform for decision making and collaboration. Later, the features of the system were improved, expanded, and consequently implemented as a University-wide faculty management

information system. FMIS as such, shall be used as a faculty development and mentoring system, whereby junior faculty can define their main interests and what they want to achieve; accordingly, they select the required supporting and core competencies with their key-anchored behaviors and start working to develop their own professional niche, supported by their mentors or dedicated group of peers. Wulf et al. (2018) defined the role of mentor by providing their mentees with training opportunities and assignments that would help them develop their competencies and achieve their own goals.

In 2016, the FM-AUBMC acquired EPIC as their new electronic health record (EHR), named AUBHealth and implemented it in November 2018. This implies that physicians will likely be spending more time on computer terminals fulfilling their required clinical work with patients, documenting care plans, and other academic responsibilities. Squiers et al. (2017), as well as Woolhandler & Himmelstein (2014), reported that increasing demand of medical bureaucracy and involving significant clerical and non-clinical related duties and the introduction of electronic health records are among the very work-related factors, which contribute to lower job satisfaction and dissociation among physicians. The work environment with FMIS and AUBHealth will be disruptively changing the workplace; thus, physicians, among other healthcare workers, will have to adapt to these new work conditions and spend more time on training to learn new skills required by this technology, managing and tolerating system errors and other related stressors. According to the survey conducted on users after implementing AUBHealth, out of 664 respondents, 79% believed that it improved the quality of patient care, and out of 730 respondents, 93% were satisfied, 92% felt supported while using the system, and 91% found the system easy to use (AUBHealth, 2019).

The LeAPS Program and Physicians' Wellness

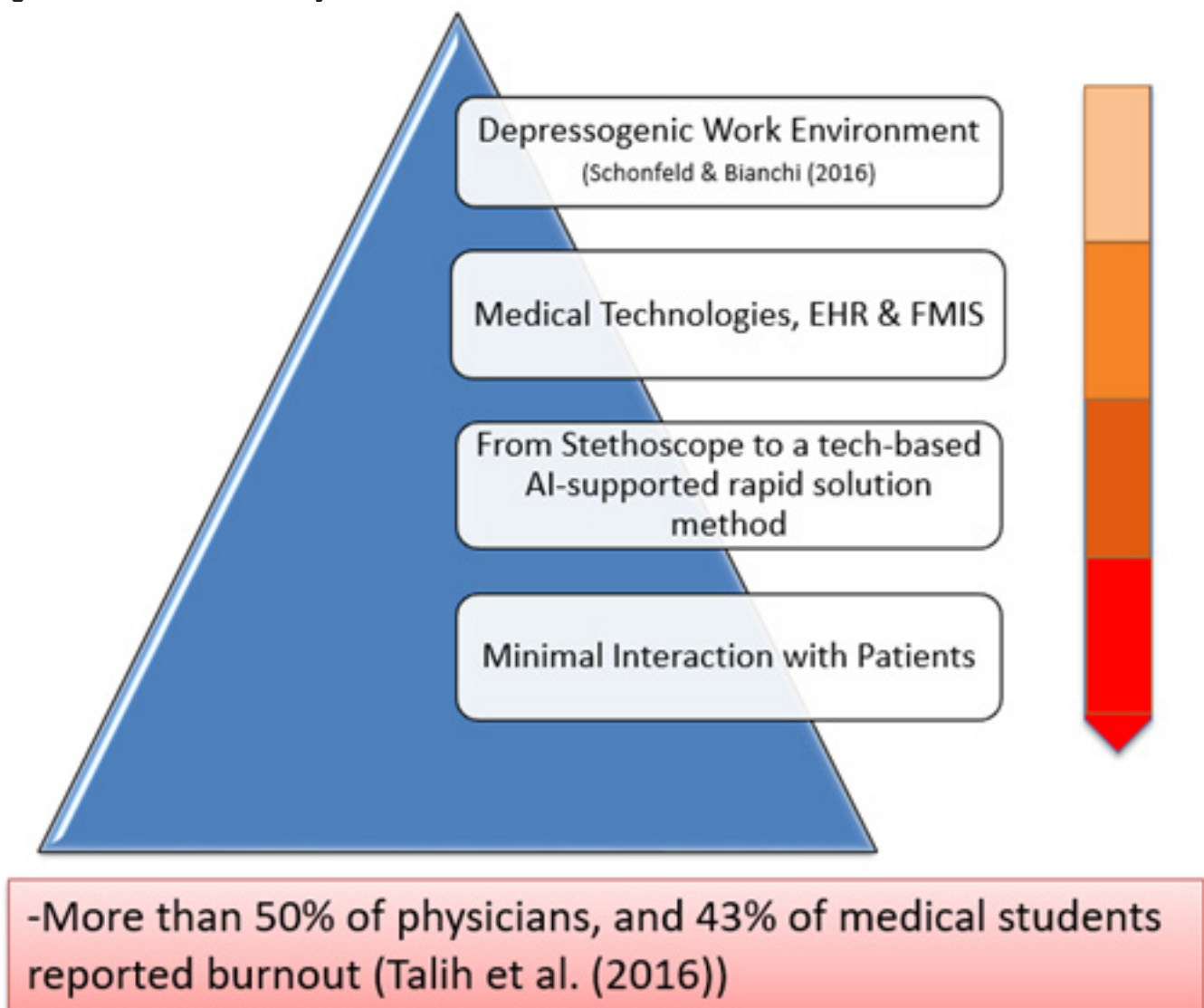
Talih et al. (2016) reported that physicians' burnout related issues have reached alarming levels among healthcare providers with more than 50% of physicians and 43% of medical students reported burnout. Ekman & Krasner (2017) portrayed three situations where physicians resonate the pain that they see and encounter daily; they mentioned that physicians either echo patients' suffering with empathy by providing supportive communication to them, or, conversely, distance themselves and lose own enacted empathy. Accordingly, they suggested using contemplative science and mindfulness training to increase emotional awareness of physicians. Moreover, Shanafelt et al. (2012) stressed the importance of exercise, forming own wellness strategies, identifying and focusing on achieving personal and professional goals and nurturing religious life on own resilience. Developing physicians' empathy appeared as a core competency for academic physicians while defining their multifaceted roles and expectations; these outcomes were presented as a value chain-model that aimed at providing sustainable personal and professional development for physicians, and business outcomes and

return on investment to the institution (Mansour, 2014). According to West et al. (2016), the combined individual-focused and organizational strategies have a positive impact on reducing burnout domain scores, despite the fact that the actual effect has not been explored yet. Rahal Alameh et al. (2015) stressed the importance of institutionalizing the faculty development program to take into consideration the well-being of physicians, while Schonfeld & Bianchi (2016) stressed the importance of making work environments less depressogenic and reducing excessive workload. The figure below summarizes the dilemma of physicians' burnout and the factors contributing to it as reported in the literature.

The Leadership Programs for Academic Physicians and Scientists (LeAPS) has been developed at FM-AUBMC aiming at improving physicians' wellbeing through developing their self-awareness, AI, and leadership competencies. Acquiring these competencies is critical for their present and future success, in performing their tripartite roles in medical education, research, and leadership. Accordingly, physicians are expected to be well equipped with the required knowledge, skills, abilities and all other qualities to manage their emotions,

to become more self-aware, and to remain focused in order to achieve their personal and professional goals. According to Mesko et al. (2018), the AI will ultimately become available as a cost-effective, efficient, rapid, and widespread technology to provide an evidence-based and affordable medical practice, and that, by taking over certain tasks from physicians; it is going to improve their doctor-patient relationship, the overall quality care, as well as their job environment and conditions. Miller and Brown (2018), on the other hand, concluded that, while medical students are still being taught using the stethoscope, a tool that was invented in 1816, practicing medicine is composed of series of relative diagnosis, evidence-based and pattern recognition, where machine learning proved to be faster and more accurate in recognizing these patterns, and thus contributing positively to patient care. In addition, Verghese et al. (2018) reported that AI, and by freeing physicians from overwhelming tasks, "could bring back meaning and purpose in the practice of medicine while providing new levels of efficiency and accuracy", which in turn, give back physicians the power of serving as a real partner in the patient care process. Hence, AI will allow physicians to stop doing the redundant daily routine work, give them the opportunity to improve their

Figure 1: The Dilemma of Physicians' Burnout



doctor-patient relationship and doctor-doctor relationships and patient care, increase efficiency and productivity, and most importantly focus on the important matters that help them achieve their personal and professional goals.

Drucker (2005) emphasized the importance of knowing and cultivating deep understanding of oneself, developing oneself, managing oneself, and placing oneself where one can make the greatest contribution, or in brief to be your own chief executive officer who uses these combinations of strength and self-knowledge to achieve a sustainable excellence. Based on this argument, LeAPS helps each physician who signs-up for the program, understand one's own strengths and weaknesses, discover how does she/he learn and work, discover own values, and where does she/he belong and can contribute. After completing such an exercise, LeAPS will help each physician carve one's personalized plan with clear study plan and learning outcomes that suit their personal and professional goals and objectives. It allows the participant to complete the program at her/his own pace, using the flip e-learning model. Flipping between discussing the plan with an expert, e-learning, and assessing outcomes has been designed to fit physicians' busy schedules. LeAPS as such, is a platform that allows physicians to cultivate deep understanding of oneself, carve individualized plans with clear goals and targets, and provide them with the technical tools that help them overcome challenges and achieve these goals as shown in Figure 2.

LeAPS consists of two groups of competencies: core competencies which entail targeting building the self-awareness, artificial intelligence, and leadership capabilities among participants; in addition to role-specific competencies targeting specific roles that suit a physician's specific plans and include: a. medical education, b. patient-care, c. management, d. clinical research, and e. basic/translational research. Once physicians select their academic tracks, they meet with the expert to help them set their personal and professional specific goals and design the program that fits best their ability to achieve their respective targets. Bhatia (2018) mentioned that AI, has the ability to analyze big information in seconds and quickly correlate it against patterns; these will be transforming the way patient care is currently delivered through augmenting physicians' capabilities and productivity. In the same venue, Leventhal (2017) reported that more than 84% of healthcare surveyed executives believe that AI will drastically change the way they manage and deal with customers, while 72% of them reported that they are already using virtual assistants to create better customer interactions. Landi (2018), on the other hand, reported that many forward-thinking leaders in healthcare business foresee that AI augmented physicians will be able to provide better patient-care outcomes at a lower cost. AI will not replace physicians; but augmented with AI, physicians will streamline their workflow and support their intelligent decision making much faster (Ahmed, 2018). If AI or Machine Learning is embedded into the clinical processes and seamlessly embraced by physicians, then, the perceived benefits will be realized. A typical workday of a radiologist operating in a tertiary healthcare center

starts with a large number of requests from several units, especially the CCU, ICU, NICU, EU, etc... The majority of these requests, if not all - are labeled "urgent". Using an AI algorithm to smartly filter such an overwhelming workload, results in classifying these exams for example in two categories - positive or negative - by continuously analyzing the produced images in the background, thus prioritizing the reading workload for the busy radiologist. The radiologist would then be able to tackle the positive cases first then direct his or her attention to the less urgent negative cases. This AI-supported workflow increases the radiologist's efficiency, decreases reporting turnaround time, and decreases burnout through empowering the radiologist in making him/her in control of the workload as well as through setting personalized reading priorities. On the other end, the referring/requesting physician receives the results faster; primarily the positive cases among them. All these factors combined together, reduce physicians' stress at both requesting and reporting ends. Nevertheless, what are the competencies required for future physicians? Azar (2018) mentioned that physicians have no other alternative but to learn how to work with AI technologies, and that AI will not be replacing physicians, but will be replacing those who are unable to work with AI.

LeAPS program, which started in 2012 as a faculty development initiative aiming at developing physicians' business skills (Rahal Alameh et al. 2014), has evolved into a technology and research-based type that supports physicians in achieving their goals. Similarly, recent interventions that targeted clinicians working in ICU reported positive outcomes in this regard (Seaman et al. 2018). Ever since its establishment in 2012, coupled with individualized mentoring and guidance efforts by the faculty affairs office, faculty members have achieved 100% success rate in faculty promotions (Figure 3; Faculty Affairs Office, 2018).

Using the latest IT technologies, LeAPS goals go beyond helping physicians achieve academic promotions; it is rather expected to have positive outcomes on reducing physicians' burnout, to increase awareness of their areas of strength, weaknesses, and blind spots, and to equip them with the required core and role-specific competencies to succeed and achieve results at personal and professional levels. Wulf et al. (2018) reported that "a missing link in the development of individual faculty members is a tool to trigger structured reflection in competency-based domains relevant to growth as an academician".

There are arguments on restructuring medical curricula around AI modules - and with the inclusion of AI - to augment practicing physicians and prepare the future ones to be able to succeed amidst ever-evolving roles. Ramachandran (no date) said that "we need to change the way we think about how to approach a patient's problem and shift the diagnostic and treatment process from an Oslerian/Hippocratic/dogmatic approach with archaic instruments like the stethoscope to a tech-based AI-supported rapid solution method". Azar (2018) mentioned that the skills required for admitting medical students

Figure 2: LeAPS Structure



Figure 3: LeAPS Core and Role-Specific Competencies

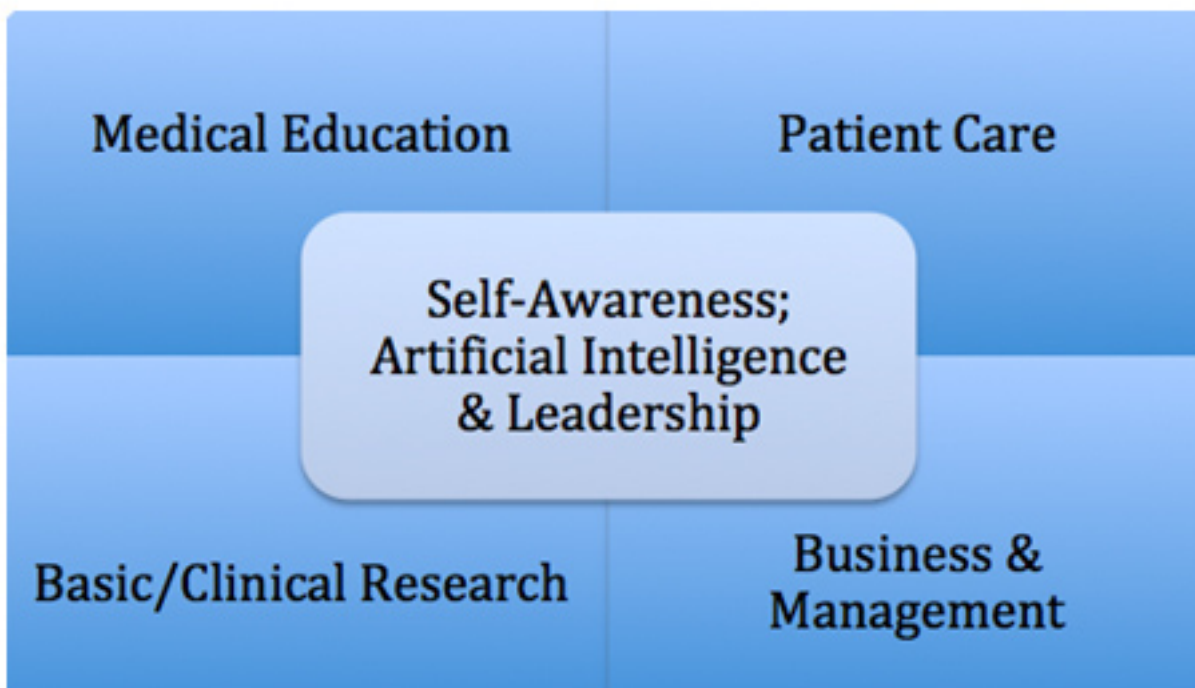
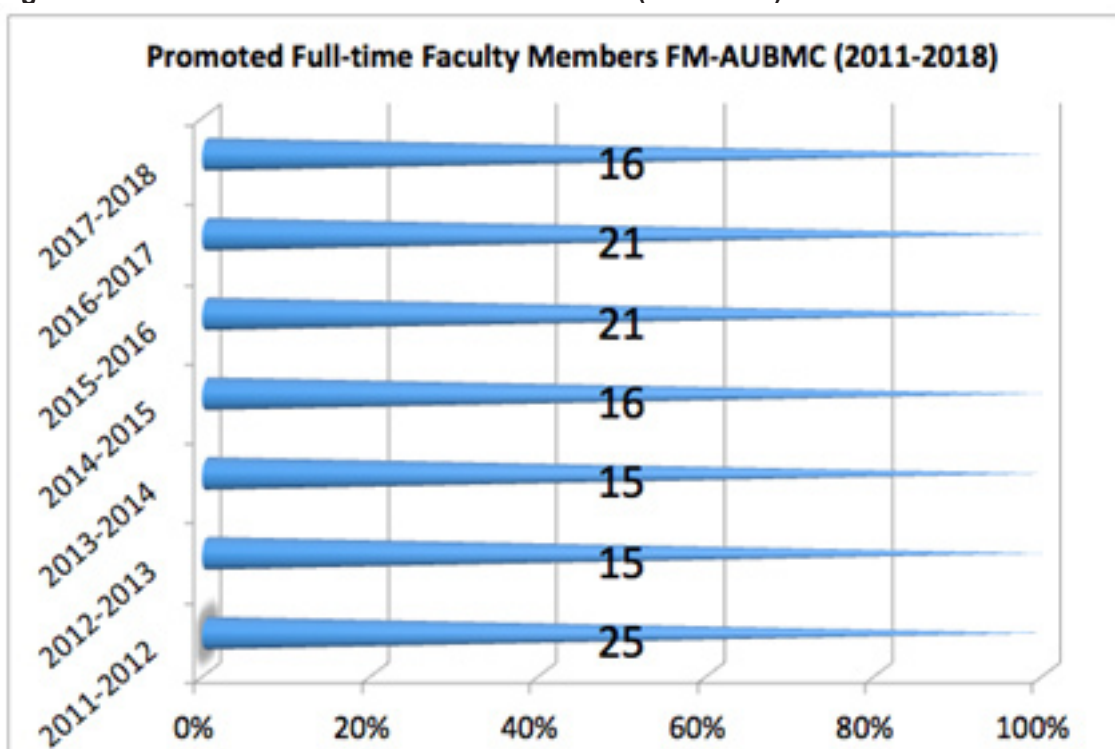


Figure 4: Promotion Success Rates at FM/AUBMC (2012-2018)



have changed from biology and chemistry competencies, into mathematics and physics, to the “clinical skills” as family medicine for instance, is far more than accurate diagnosis and often involves the issues not taught in medical school. There is a repeating cycle where emphasis on holistic medicine and clinical medicine alternate in focus, as focus on one area tends to deplete the other. Hence, AI ought to be interwoven in the fabric of LeAPS program as a means of dynamically developing skills of academic physicians to help them replace their simple diagnostic tools with AI-supported solutions.

Introducing AUBHealth and training physicians on embracing it, is simply a good start to approach the ultimate integration of AI into the healthcare domain. Introducing AI-supported technologies will be the next big leap towards the disruptive change in healthcare industry; it is all about empowering trained physicians to make smarter and faster decisions leading to cost-effective and better outcomes. Ahmed (2018) quoted B. Anderson “I think one of the biggest contributions deep learning / artificial intelligence will realistically make to me as a Radiologist in the near future is not directly helping with image interpretation, but in bringing the relevant information out of the clinical information system (CIS) / electronic medical record (EMR) and presenting it to me in a meaningful way to better inform my clinical judgment”

Augmented artificial intelligence and how it practically works?

The physician defines the challenges disrupting their own workflow and consuming time and energy. Here comes the role of AI to find solutions and enhance a specific time-consuming process. A good recent example reported by Ahmed (2018) is the tuberculosis screening program at Dubai Healthcare Authority (DHCA). For instance, busy radiologists are facing the daily challenge of reading around 5000 chest x-rays aimed to specifically diagnose or rule out tuberculosis (TB), which ends up being costly and results in physicians’ burnout. DHCA funded an AI project (Ahmed, 2018) to develop a TB screening algorithm that is currently used across 20 healthcare centers. The outcomes were encouraging; image analysis and reporting became much faster. At the same time, physicians freed their time focusing on quality and more advanced procedures, significantly improving their turnaround times for validating imaging reports, positively influencing patient satisfaction scores, and reducing cost. Practically, how does LeAPS work in order to prepare academic physicians acquire new skills and be AI augmented?

A physician who has declared their own primary goal and showed interest in developing or in becoming an AI expert or in building an AI model, will be assigned a mentor or a group of experts who are technically savvy with this area. They will help the concerned physician build the technical competency and expertise in this domain, and provide her or him with the training opportunities to be able to build or help in building such a model with assigning measurable outcomes to monitor their own progress down the line.

Assessing physician’s progress occurs using the achievements and development level of required competencies and their relevant key-anchored behaviors to ensure that the concerned physician is on the right track to achieve their own goals.

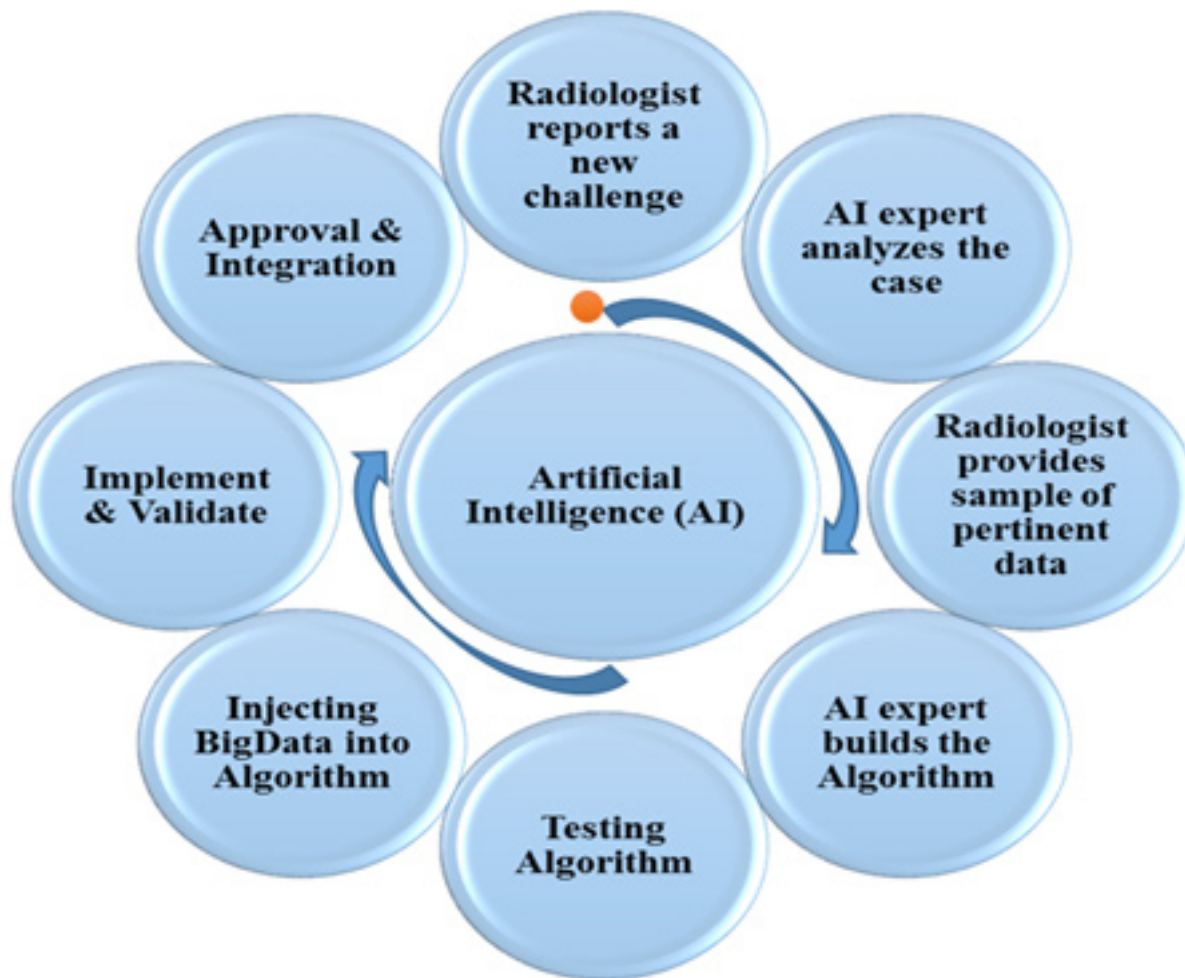
Artificial Intelligence is neither an on-shelf type of product, nor a software concept that people can acquire and use, but rather a complex process that requires full collaboration between the subject matter and the AI experts. People fear AI due to their speculations about its role in disrupting the workplaces and redefining their roles in society. However, implementing LeAPS pedagogical framework through “anchoring measurements to current and desired future behavior allows for tactical faculty development” (Wulf et al. 2018) helps paving the way for physicians to be AI technically savvy and ready to implement or participate in implementing AI projects, achieve their own goals and promote their careers. The role of LeAPS in this sense is fundamental in augmenting and training physicians on the new set of skills required, including full understanding of the AI models, their roles in facilitating the workflows, improving efficiency, and reducing their stress and burnout. The following example will clarify the relationship between the subject matter experts and AI experts, and sets an example of how an AI algorithm can be built.

The physician (radiologist in this case) defines the challenge disturbing own workflow, consuming time, energy, and leading to burnout. The AI expert collaborates with the physician to document and develop an algorithm based on deep learning concept, as a sample model, that upon augmenting with big-data, becomes ready to recognize patterns, analyze images, and generate reports for the radiologist’s final validation. The testing phase is the most critical phase for the radiologist to validate and approve algorithm outcomes based on comparing those results with those interpreted and analyzed by other radiologists; a concept known as double-blind reading methodology. Then come the verification and approval phases prior to launching and integrating the augmented AI solution either with EHR or PACS systems.

Conclusion

The digital era with its innovative technologies has started influencing all business domains, including the healthcare industry. It is anticipated that preparing physicians, among other healthcare workers, through building augmented AI, leadership, and self-awareness capabilities would place them in a better position to be in control of their personal and professional experiences, prepare them to embrace AI and latest technologies, increase self-awareness, and consequently, reduce burnout. Institutional intervention and physician’s buy-in have to go hand-in-hand to embrace disruptive technologies, improve patient care, reduce burnout, and achieve business outcomes. The proposed LeAPS model represents a non-traditional technology and research-based institutional initiative that aims at helping physicians acquire certain competencies

Figure 5: Artificial Intelligence Model for Medical Imaging Services



that are critical for their success in their tripartite roles in medical education, research, and leadership. LeAPS as such, is a platform that allows physicians to cultivate deep understanding of oneself, carve individualized plans with clear goals and targets, and provide them with the technical tools that help them overcome challenges and achieve these goals by assuming the role of own chief executive officer and be in full control of their own success. Finally, embracing AI aims at coping with the innovative technologies to improve workflow processes, increase productivity, implement cost-effective healthcare strategy, and reduce physicians' burnout. The institution, however, needs to maintain its focus on promoting and facilitating people's communication, especially among physicians and healthcare workers. The institution's support for exchange of ideas, discussions, and collaboration will undoubtedly alleviate stress and depressogenic environment and physicians' burnout. Institutional leadership, as such is expected to focus on deploying AI to cultivate a professional and conducive environment that simultaneously promotes physicians' productivity and all other aspects of their well-being.

Notwithstanding these research-reported favorable outcomes, there are certain limitations that ought to be considered before replication. Among these is the need for further in-depth assessment of the outcome which should be compared to a control group where standardization of its

learning outcome and material contents were considered to be able to, identify the degree of contribution of each component to the program's success.

Finally, no one has spoken on the importance of physicians' self-awareness better than McLeod (2003, p. 2135) addressing his fellow physician-colleagues: "often there is a need to reexamine our life priorities, set limits at work, admit vulnerability, share our emotional lives, and appreciate the small things in our daily life that give us meaning and purpose."

References

1. Ahmed, A. (January 2018). Health Imaging Augmented Intelligence: The Next Frontier. Agfa Healthcare. <https://www.healthcareitnews.com/news/augmented-intelligence-next-frontier-health-imaging>. Retrieved on October 29, 2018.
2. Ahmed, A. (March 2018). Health Imaging Augmented Intelligence: The Next Frontier. Agfa Healthcare. <https://20urhr2fv6851nsk28rdz11-wpengine.netdna-ssl.com/int/wp-content/uploads/sites/3/2018/02/Agfa-WhitePaper-Value-based-AI-Dubai.pdf>. Retrieved on October 29, 2018.
3. American University of Beirut Medical Center. <http://www.aub.edu.lb/fm/fao/fd/pages/purpose.aspx>. Retrieved on December 20, 2013.

4. AUBHealth (2016). American University of Beirut Medical Center. <http://www.aubmc.org.lb/Pages/American-University-of-Beirut-Medical-Center-Leads-a-New-Era-in-Patient-Care-with-Epic-Electronic-Health-Record-System.aspx>. Retrieved on October 28, 2018.
5. AUBHealth (2019). American University of Beirut Medical Center. (unpublished report).
6. Azar, D. (September 2018). Innovation-Medicine: A novel track in medical education at the University of Illinois College of Medicine. AAHCI MENA Regional Conference: "Transformation of Medical Education in the New Era". September 27-29, 2018. American University of Beirut.
7. Bhatia, T. (2018). Artificial Intelligence In HR – The Future Of Work Is Already Here!. <https://emptrack.com/blog/artificial-intelligence-in-hr/>. Retrieved on October 29, 2018.
8. Daouk-Öyry, L., Zaatari, G., Sahakian, T., Rahal Alameh, B., & Mansour, N. (2017). Developing a competency framework for academic physicians. *Medical teacher*, 39(3), 269-277.
9. Davis, J. (2018). Physician, Heal Thyself. *Physician Leadership Journal*, 5(1), 26-29. Retrieved from <https://search-proquest-com.ezproxy.aub.edu.lb/docview/1978598333?accountid=8555>
10. Decety, J., & Meyer, M. (2008). From emotion resonance to empathic understanding: A social developmental neuroscience account. *Development and psychopathology*, 20(4), 1053-1080.
11. Dhingra, M., Tewari, R., & Li, M. (2016). Resilience training in medical school: the solution to doctor burnout?
12. Dierckx de Casterlé, B., Willemsse, A. N., Verschueren, M., & Milisen, K. (2008). Impact of clinical leadership development on the clinical leader, nursing team and care-giving process: a case study. *Journal of Nursing Management*, 16(6), 753-763.
13. Drucker, P. F. (2005). Managing oneself. *Harvard Business Review*, 83(1), 100-109.
14. Dyrbye, L. N., & Shanafelt, T. D. (2011). Physician burnout: a potential threat to successful health care reform. *Jama*, 305(19), 2009-2010.
15. Dyrbye, L. N., Shanafelt, T. D., Sinsky, C. A., Cipriano, P. F., Bhatt, J., Ommaya, A., ... & Meyers, D. (2017). Burnout among health care professionals: A call to explore and address this under-recognized threat to safe, high-quality care. *NAM (National Academy of Medicine) Perspective*.
16. Ekman, E. & Krasner, M. (2017). Empathy in medicine: Neuroscience, education and challenges, *Medical Teacher*, 39:2, 164-173, DOI: 10.1080/0142159X.2016.1248925
17. Epstein, R. M., & Hundert, E. M. (2002). Defining and assessing professional competence. *Jama*, 287(2), 226-235.
18. Faculty Affairs Office, Faculty of Medicine, American University of Beirut (2018). Unpublished report.
19. Goleman, D. OnePercentBetter (publisher). (December 2015). Emotional Intelligence. Retrieved from: <https://youtu.be/n6MRsGwyMuQ>
20. Hutchinson, M., & Hurley, J. (2013). Exploring leadership capability and emotional intelligence as moderators of workplace bullying. *Journal of Nursing Management*, 21(3), 553-562.
21. Jack, K., & Smith, A. (2007). Promoting self-awareness in nurses to improve nursing practice. *Nursing standard*, 21(32).
22. Landi, H. (October 2018). Healthcare Leaders on Unlocking the Value of Disruption: "Digital Innovation Needs to be a Strategic Priority". *Healthcare Informatics*. <https://www.healthcare-informatics.com/article/innovation/healthcare-leaders-unlocking-value-disruption-digital-innovation-needs-be>. Retrieved on October 29, 2018
23. Mansour, N. (2018). Establishing a competency-based leadership program for academic physicians and scientists. Faculty of Medicine and Medical Center, American University of Beirut. (unpublished report).
24. Mansour, N. (2014). A systematic approach for establishing a competency-based mentorship program for academic physicians. Retrieved from American University of Beirut Library Catalog. (APJ Pj:1793, Jafet/ASC).
25. McLeod, M. E. (2003). The caring physician: a journey in self-exploration and self-care. *The American journal of gastroenterology*, 98(10), 2135-2138.
26. Meskó, B., Hetényi, G., & Györfy, Z. (2018). Will artificial intelligence solve the human resource crisis in healthcare?. *BMC health services research*, 18(1), 545.
27. Miller, D. D., & Brown, E. W. (2018). Artificial intelligence in medical practice: the question to the answer?. *The American journal of medicine*, 131(2), 129-133.
28. Oliva, A., Pasha, R., Conant, R. (no date). Amplifying intelligence to put patients over paperwork: implementing artificial intelligence (AI) and virtual tools in the examining room. Nuance. https://25ad4f829d1902bbebfd-26d8892507868171132ab49155989078.ssl.cf2.rackcdn.com/Nuance_WP_03052018.pdf?submissionGuid=e8bfb176-3b22-4764-9107-c622edc3044b. Retrieved on October 29, 2018.
29. Orzech, K. M., Shapiro, S. L., Brown, K. W., & McKay, M. (2009). Intensive mindfulness training-related changes in cognitive and emotional experience. *The Journal of Positive Psychology*, 4(3), 212-222.
30. Patterson, F., Ferguson, E., Lane, P., Farrell, K., Martlew, J., & Wells, A. (2000). A competency model for general practice: implications for selection, training, and development. *Br J Gen Pract*, 50(452), 188-193.
31. Rahal Alameh, B. & Mansour, N. (2010). Introducing the Faculty Management Information System (FMIS) to the Faculty of Medicine and Medical Center (FM/AUBMC) and the American University of Beirut (AUB). Faculty of Medicine and Medical Center, American University of Beirut. (unpublished document). (Unpublished manuscript and program framework).
32. Rahal Alameh, B., Mansour, N., & Zaatari, G. (2015). Towards Developing A Sustainable Faculty Development Program. *Lebanese Medical Journal*, 63(4), 213.
33. Rajiv, L. (August 2017). Artificial Intelligence: The Next Frontier in Health IT?. *Healthcare Informatics*. <https://www.healthcare-informatics.com/article/analytics/artificial-intelligence-next-frontier-health-it-part-1>. Retrieved on October 29, 2018.
34. Ramachandran, M. (September 2018). Preparing future doctors for AI: What new skills are needed? AAHCI MENA Regional Conference: "Transformation of Medical Education in the New Era". September 27-29, 2018. American University of Beirut.

35. Ramachandran, M. (no date). Interview to Doctorpreneurs.com <http://www.doctorpreneurs.com/manoj-ramachandran-co-founder-viz-ai/>. Retrieved on October 29, 2018.
36. Randall, R., Davies, H., Patterson, F., & Farrell, K. (2006). Selecting doctors for postgraduate training in paediatrics using a competency based assessment centre. *Archives of disease in childhood*, 91(5), 444-448.
37. Sagin, T. http://www.namss.org/Portals/0/StateAssociations/Colorado/FPPE_OPPE%20Best%20Practices.pdf. Retrieved on June 6, 2018)
38. Scheepers, R. A., Boerebach, B. C., Arah, O. A., Heineman, M. J., & Lombarts, K. M. (2015). A systematic review of the impact of physicians' occupational well-being on the quality of patient care. *International journal of behavioral medicine*, 22(6), 683-698.
39. Seaman, J.B., Cohen, T.R., & White, D.B. (2018). Reducing the stress on clinicians working in the ICU. *JAMA*. Published online October 24, 2018. Doi:10.1001/jama.2018.14285.
40. Squiers, J. J., Lobdell, K. W., Fann, J. I., & DiMaio, J. M. (2017). Physician burnout: are we treating the symptoms instead of the disease? *The Annals of thoracic surgery*, 104(4), 1117-1122.
41. Schonfeld, I. S., & Bianchi, R. (2016). Burnout and depression: two entities or one?. *Journal of Clinical Psychology*, 72(1), 22-37.
42. Sexson, S., Sargent, J., Zima, B., Beresin, E., Cuffe, S., Drell, M., & Sylvester, C. (2001). Sample core competencies in child and adolescent psychiatry training. *Academic Psychiatry*, 25(4), 201-213.
43. Talih, F., Warakian, R., Ajaltouni, J., & Tamim, H. (2016). Correlates of depression and burnout among residents in a Lebanese academic medical center: a cross-sectional study. *Academic Psychiatry*, 40(1), 38-45.
44. The Lancet (2017). Suicide among health-care workers: time to act. *Lancet* (London, England), 389(10064), 2.
45. The Lancet. (2009). Physician, heal thyself. *Lancet* (London, England), 374 (1714), 21.
46. Verghese, A., Shah, N. H., & Harrington, R. A. (2018). What this computer needs is a physician: humanism and artificial intelligence. *Jama*, 319(1), 19-20.
47. Wallace, J. E., Lemaire, J. B., & Ghali, W. A. (2009). Physician wellness: a missing quality indicator. *The Lancet*, 374(9702), 1714-1721.
48. West, C. P., Dyrbye, L. N., Erwin, P. J., & Shanafelt, T. D. (2016). Interventions to prevent and reduce physician burnout: a systematic review and meta-analysis. *The Lancet*, 388(10057), 2272-2281.
49. Woolhandler, S., & Himmelstein, D. U. (2014). Administrative work consumes one-sixth of US physicians' working hours and lowers their career satisfaction. *International Journal of Health Services*, 44(4), 635-642.
50. Wulf, K. L., Hurtubise, L., Brod, H., & Binkley, P. F. (2018). The CARE Inventory: A Self-Reflective, Behavior-Based Instrument to Guide Professional Development and Mentorship of Academic Faculty. *MedEdPORTAL: the journal of teaching and learning resources*, 14.

Abdominal wall - large ventral hernias and incisional hernia: (Recent developments - the use of imaging and Botox injection)

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Introduction

Both ultrasound and CT scanning have become increasingly useful in the diagnosis and management of conditions of the abdominal wall, particularly hernias. Large ventral, incisional and recurrent hernias remain a significant challenge despite the introduction of mesh, component separation and laparoscopy.

Recurrence rates remain between 7% and 48%.

Abdominal wall masses may include subcutaneous lipomas or rarely, muscular tumours. Ultrasound may also diagnose ruptures of the rectus muscle from either a direct blow or excess effort or straining.

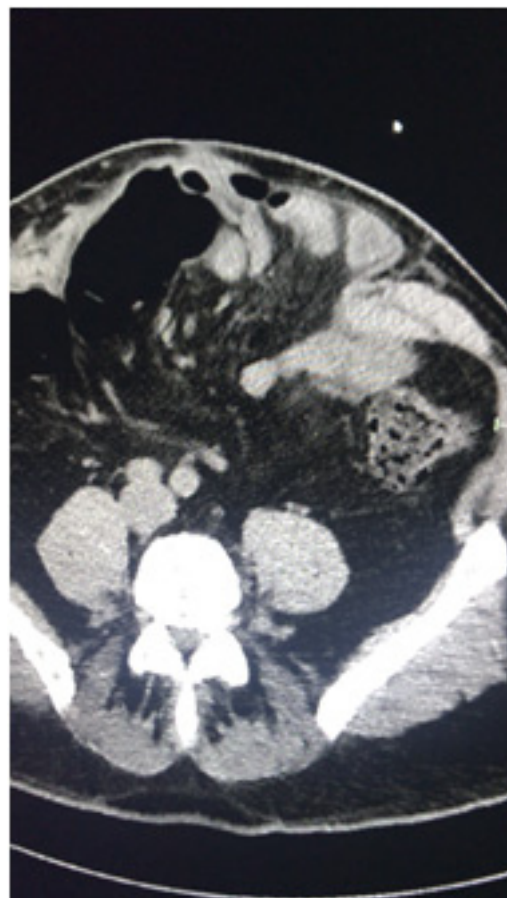
Hernias

Imaging

Both ultrasound and CT are used in the diagnosis and management of hernias.

An ultrasound can demonstrate small Spigelian hernias which are often concealed. These can even be confused with an inguinal hernia. They are not as useful for very large hernias as it is difficult to outline the whole defect.

The ultrasound can be used in the assessment of umbilical and epigastric hernias. The size of the defect may be relevant in deciding whether a mesh is used, thus facilitating an informed consent discussion regarding the use of mesh. It may also detect additional small epigastric hernias ensuring that they are not missed at surgery. An emerging use of ultrasound is as a guide to the placement of Botox, in the management of large ventral or incisional hernias.



Incisional hernia coronal view



This is a ct sagittal view demonstrating a large incisional hernia extending almost to the symphysis pubis.

CT SCANS

CT scans are most useful for very large ventral or incisional hernias, as they accurately locate and measure the number and size of the defects. This is not feasible with ultrasound alone. It is useful for the surgeon to pre-operatively anticipate the size of the mesh required and the complexity of the operation.

The CT also defines the contents of the hernia, be it omentum, bowel or fluid. It may also be used to exclude other intra abdominal coexistent pathology.

Botox

A recent important innovation is the use of Botox in the management of large ventral hernias. Botox is injected under ultrasound control into the bellies of the three lateral abdominal wall muscles on each side, two weeks prior to surgery. The Botox relaxes these muscles and enables apposition of the rectus muscles more easily. The loss of domain which can impair respiration once the hernia is closed is also minimized because of the flaccidity of the lateral abdominal wall muscles from the Botox. This lasts for about 6 weeks. This flaccidity also reduces the risk of recurrence.

It also reduces the levels of post operative pain which is often significant even with laparoscopic repair. The effect lasts for a many weeks further reducing the risk of recurrence

In Botox research the scan shows the 3 lateral abdominus muscles are lengthened considerably . This reduces the size of the defect to be closed.

The Melbourne Hernia Clinic has an educational site devoted to hernias and office surgery. A/Prof Maurice Brygel also conducts skills workshops for GPS - for details: visit www.hernia.net.au

