Practicing healthy lifestyle behaviors among physicians in public primary healthcare centers, Jeddah, Saudi Arabia

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ABSTRACT

Background: Primary healthcare centers (PHC centers) physicians play a vital role in health promotion. This study evaluated healthy lifestyle behavior practices among the public PHC centers physicians in Jeddah, Saudi Arabia. *Methods:* This was an online cross-sectional study using a questionnaire and the WHO STEPwise approach to NCD Risk Factor Surveillance (STEPS) instrument. Data were analyzed by the statistical package of social science SPSS version 27. P-value < 0.05 will consider for significance. *Results:* Our study received 212 responses. Most respondents had overweight and obesity (61.7%), hypertension (82.1%), hyperlipidemia/dyslipidemia (19.3%), hypertension (10.8%) and diabetes mellitus (9.4%). Of all respondents, 8.5% knew 100% of scientific evidence about lifestyle medicine and 46.5% and 30.2% reported to know three-fourths and a half of practical lifestyle medicine, respectively. The vast majority significantly (p=0.000) agreed that physicians should apply lifestyle medicine services to every patient. Female gender (p=0.030), older age (p=0.000), marriage (p=0.000) and higher education levels (p=0.030) were associated with updates of knowledge (p=0.030) and giving more advice to patients about physical activities. Eating 4-5 servings of fruits (p=0.008) and vegetables 3-5 days a week (p=0.028) and never adding salt to the meal (p=0.000) were significantly associated with more frequent updates of knowledge of lifestyle medicine and always advising patients to perform physical activities. *Conclusion:* Our findings showed poor knowledge updates, good attitude and willingness to practice healthy behaviors and lifestyle medicine, highlighting the need for incorporating lifestyle medicine concepts in medical education and training of physicians.

Keywords: Lifestyle Behaviors, Lifestyle Medicine, Healthy Lifestyle, Physicians

1. INTRODUCTION

Primary healthcare centers (PHC centers) play a vital role in health promotion by providing people with quality care, promoting self-care, prevention, treatment, rehabilitation, and palliative care (Hidalgo et al., 2016). Individuals, families, and communities contact PHC centers first as their first level of

access to the healthcare system for their health problems (Hidalgo et al., 2016; Martinez et al., 2017). By addressing social determinants of health, PHC centers help people and communities get control of their healthy lifestyle, preventing disease root causes and morbidities and promoting healthy behaviors, health equity, and holistic care (Martinez et al., 2017).

Physicians' role in promoting health is undisputed, and lifestyle medicine has emerged as another essential medical subspecialty that uses the evidence-based therapeutic approach to prevent, treat, and reverse lifestyle-related chronic diseases (Oberg & Frank, 2009). Physicians are health role models to their patients and society, and practicing healthy behaviors helps them to give health promotion counseling and healthy lifestyle advice to the patients. In addition, physicians are more trusted by patients as they are often open to them about their health privacy. Counseling by physicians is more effective than counseling by a health coach (Bazargan et al., 2009; Oberg & Frank, 2009). It was found that Physicians' health behaviors practices are associated with health advice, counseling, and screening practices with patients, and physicians with unhealthy behaviors have difficulties in inciting patients to change unhealthy lifestyles (Bazargan et al., 2009; Hidalgo et al., 2016; Martinez et al., 2017; Helal & El-Awady, 2022).

A study investigating lifestyle factors and quality of life among PHC physicians in Medina, Saudi Arabia, revealed lower scores in obese physicians and physicians with an unhealthy diet dominated by meat and other animal products. A positive quality of life was reported in physicians who eat a healthy diet with more vegetables and physicians with a high level of exercise. In this study, about a quarter of physicians reported unhealthy lifestyles and related chronic diseases (Aljohani & Al-Zalabani, 2021). In a study conducted in Riyadh, Saudi Arabia, at 3 district hospitals, 34.8% of the physicians were smokers, and the majorities were male (70.4%) physicians. Residents were the most smokers (50%), and smoking in medical interns and registrars accounted for 22.4% and 15.3%, respectively (Al Shahrani et al., 2021).

Considering the role of PHC centers in health promotion coupled with the physicians' impact on patients and their influence on society, the PHC centers physicians greatly influence changing people's habits, lifestyles and behaviors (Martinez et al., 2017). In terms of lifestyle medicine which is interested in preventive healthcare and self-care practices, physicians' healthy lifestyle behaviors impact the motivation of patients to improve the quality of their lives. Improving physicians' lifestyles and practice of healthy behaviors could help in health promotion, improve their interaction with patients, impact patients and promote lifestyle change and self-care, reducing lifestyle-related diseases and other non-communicable diseases influenced by lifestyle. Due to a scarcity of studies exploring healthy lifestyle behavior practices among PHC centers physicians, our study evaluated healthy lifestyle behavior and lifestyle medicine practices among the public PHC centers physicians in Jeddah, Saudi Arabia.

2. MATERIAL AND METHODS

Study Design

We conducted a cross-sectional study on all licensed physicians working at the Ministry of health in primary healthcare centers (public PHC centers) in Jeddah city, Saudi Arabia from May 2022 to June 2022. The minimum sample size to achieve a precision of ±7% with a 95% confidence interval was calculated to be 196 using the following formula

$$n = \frac{Z^2 \times P \times Q}{D^2} = \frac{(1.96)^2 \times 0.5 \times 0.5}{(0.07)^2} = 196$$

Where n: Calculated sample size, Z: The z-value for the selected level of confidence= 1.96, P: 50%, assumed proportion of participants for maximum sample size calculation, Q: (1 – P) = 50%, D: The margin of error = 0.05.

A multistage stratified sampling technique was used to stratify PHC centers into five clusters (north, east, west, south, and center) of Jeddah city. Five centers were selected randomly from each cluster sector (cluster) using a simple random technique. The total sample size of 200 was divided equally into 25 centers. The calculated number of 8 participants was obtained proportionally from each center by simple or systematic random sampling.

Data collection instrument

We used an anonymous, pre-designed, and valid questionnaire adapted from Alsubhi et al., (2019) and the WHO STEPwise approach to NCD Risk Factor Surveillance (STEPS) instrument. The questionnaire was revised by an expert panel of public health consultants, preventive medicine physicians, health informatics, and health administration to ensure face and content validity. It inquired about socio-demographics, overall health, and health habits. It included questions about physical activities, nutrition and eating habits, smoking, perceived health status, and general physical assessment, including height and weight, to calculate BMI. It

also included questions about knowledge, attitude, and lifestyle medicine practices. The questionnaire was distributed electronically as a Google Form link through emails and social media. The link also contained basic information about the study and its objective and participation invitation.

Data analysis

Data were analyzed by the statistical package of social science SPSS, version 27. The descriptive statistics such as frequencies and percentages were calculated to summarize nominal and ordinal data. At the same time, mean, median, mode, and standard deviation or the range was used to describe numerical variables. We performed the Chi-Square test evaluate the association between determinant and outcome variables. P-value < 0.05 was considered for significance. Regression analysis was applied to adjust for confounding factors and identify each independent variable's contribution to the dependent variable.

3. RESULTS

Our study received 212 responses. Most respondents were ages 30-40 years (55.7%), male (50.9%), Saudi nationals (94.8%), married (71.3%), had Bachelor of Medicine, Bachelor of Surgery (MBBS) (49.1%) as the highest degree and were general practitioners (55.2%). Most chronic diseases reported were hyperlipidemia/dyslipidemia (19.3%), followed by hypertension (10.8%) and diabetes mellitus (9.4%) (Table 1).

Table 1 Socio-demographic characteristics and morbidities

Attributes	Categories		Frequency	Percent
Gender	Male		108	50.9
	Female		104	49.1
	20-30		44	20.8
	30-40		118	55.7
Age	40-50		22	10.4
	50-60		21	9.9
	>60		7	3.3
Nationality	Saudi		201	94.8
	Non-Saudi		11	5.2
	Never Married / Single		44	20.8
Marital Status	Married		151	71.2
	Divorced		15	7.1
	Widow		2	0.9
	MBBS		104	49.1
	Diploma		5	2.4
Highest Level of Education	Master Degree		8	3.8
	PhD Degree		8	3.8
	Board Certified		87	41.0
	General Practitioner		117	55.2
Job Title	Specialist		59	27.8
	Consultant		36	17.0
Diabetes Mellitus?	Yes	20		9.4
	No	192		90.6
Hypertension?	Yes	23		10.8
	No	189		89.2
Hyperlipidemia / Dyslipidemia?	Yes	41		19.3
	No	171		80.7
Cardiac Disease?	Yes	8		3.8
	No	204		96.2

MBBS: Bachelor of Medicine and Bachelor of Surgery; PhD: Doctor of Philosophy

As indicated in table 2, the majority of respondents were significantly overweight and obese (61.7%, collectively) (p=0.000), and hypertensive (82.1%) (p=0.000). When asked about physical activities, those who do moderate physical activities and those who don't do activities were equally represented (42.5%) (p=0.000). Most respondents reported to do physical activities for 5 days (12.3%), 4 days (15.6%), and 3 days (14.2%) a week for 20-30 minutes (25%) and more than 30 minutes (20.8%) (p=0.000). The minority (5.7%) didn't eat fruits, while the vast majority reported eating fruits (70.8%) (p=0.000) and vegetables (68.8%) (p=0.000) 2-5 days a week. Most respondents reported always (25.9%), often (20.3%, and sometimes (36.3%) adding salt or salty sauce to the meal (p=0.00), while 54.2% sometimes eat salty processed food, 50.5% thought the added salt is in a right amount, and 23.1% thought they add too much salt. Overall, most didn't know their cholesterol levels. Of those who knew, 16% had borderline high, and 8.3% had high levels, while 41.5% had normal levels (p=0.000).

Table 2 Lifestyle Indicators

	Attributes	Categories	Frequency	Percent	P-value
Physical Assessment	Body Mass Index "BMI"	< 18.5 underweight	4	1.9	0.000
		18.5 - 24.9 normal weight	77	36.3	
		25 - 29.9 overweight	66	31.1	
		30 - 34.9 obesity class I	42	19.8	
		35 - 39.9 obesity class II	17	8.0	
		= or > 40 obesity class III	6	2.8	
	Blood Pressure Measurement	Hypertensive	174	82.1	0.000
		Not measured, does not know	38	17.9	
	Waist Circumference in Centimeter "Cm"	Less than 102cm for male / less than 88cm for female	116	54.7	0.235
		More than 102cm for male / more than 88cm for female	96	45.3	
Behavioral Assessment	Smoking	Active Smoker	54	25.5	0.000
		Non-Smoker	139	65.6	
		Ex-Smoker	19	9.0	
	What type of activities do you do?	Vigorous activities "carrying heavy load, running" continuously for at least 10 minutes	32	15.1	0.000
		Moderate intensity activities " brisk walking, swimming, cycling" continuously for at least 10 minutes.	90	42.5	
		None of the above	90	42.5	
	How many days of the week do you do these activities?	0	58	27.4	0.000
		1	27	12.7	
		2	26	12.3	
		3	30	14.2	
		4	33	15.6	
		5	26	12.3	
		6	9	4.2	
		7	3	1.4	
	How much time do you spend doing these activities per day?	Less than 10 minutes	79	37.3	0.000
		10-20 minutes	36	17.0	
		20-30 minutes	53	25.0	
		More than 30 minutes	44	20.8	
	In a typical week, on how many days do you eat fruit?	0	12	5.7	0.000
		1	22	10.4	
		2	40	18.9	
		3	33	15.6	

		4	39	18.4
		5	38	17.9
		6	12	5.7
		7	16	7.5
	How many servings of fruit do you eat on one of those days?	0	14	6.6
		1	74	34.9
		2	69	32.5
		3	28	13.2
		4	15	7.1
		5	8	3.8
		6	1	0.5
		7	3	1.4
	In a typical week, on how many days do you eat vegetables?	0	12	5.7
		1	15	7.1
		2	31	14.6
		3	38	17.9
		4	36	17.0
		5	41	19.3
		6	18	8.5
		7	21	9.9
	How many servings of vegetables do you eat on one of those days?	0	11	5.2
		1	55	25.9
		2	67	31.6
		3	41	19.3
		4	16	7.5
		5	12	5.7
		6	2	0.9
		7	8	3.8
	How often do you add salt or a salty sauce to your food?	Always	55	25.9
		Often	43	20.3
		Sometime	77	36.3
		Rarely	31	14.6
		Never	5	2.4
		Do not know	1	0.5
	How often do you eat processed food high in salt?	Always	19	9.0
		Often	29	13.7
		Sometime	111	52.4
		Rarely	38	17.9
		Never	13	6.1
		Do not know	2	0.9
Biological Assessment	How much salt or salty sauce do you think you consume?	Far too much	7	3.3
		Too much	49	23.1
		Just the right amount	107	50.5
		Too little	26	12.3
		Far too little	17	8.0
		Do not know	6	2.8
	What is your Hemoglobin A1C?	<5.7 "Normal"	117	55.2
		5.7 - 6.4 "Pre-diabetic"	27	12.7
		= or > 6.5 " Diabetic"	20	9.4
		I do not know	48	22.6
	What is your total	< 200 mg/dl "Good"	88	41.5

The p-values column (rightmost) reads: 0.000 (fruit servings), 0.000 (vegetables typical week), 0.000 (vegetable servings), 0.000 (salt added), 0.000 (processed food), 0.000 (salt consumed), 0.425 (Hemoglobin A1C), 0.007 (total).

cholesterol?	200 - 239 mg/dl " Borderline high"	34	16.0	
	= or > 240 mg/dl " High"	18	8.5	
	I do not know	72	34.0	
What is your LDL level?	< 100mg/dl "Good"	66	31.1	
	100-159 mg/dl "Borderline high"	52	24.5	0.145
	= or > 160 mg/dl "High"	16	7.5	
	I do not know	78	36.8	

Highly significant if p-value < 0.01, Significant if p-value < 0.05, Non significant if p-value > 0.05

Table 3 shows participants' responses about knowledge, attitudes, and practice toward lifestyle medicine. Only 8.5% of respondents thought they knew 100% scientific evidence about lifestyle medicine, while 46.5% and 30.2% thought they had three-fourths and a half of applicable lifestyle medicine knowledge, respectively. The most-reported significantly (p=0.000) common sources of knowledge were; evidence-based medicine sources (31.1%), continuous medical education (16.5%), and educational background (16.5%). The majority updated their knowledge about lifestyle medicine at least once a year (54.2%), every 3 months (13.7%), and every 3 to 5 years (12.3%), while 19.8% didn't update at all. Though 36.4% had taken a course about lifestyle medicine during the past 3 years, 21.2% didn't, due to the rarity of courses about lifestyle medicine, while 31.6% didn't because they didn't look for them.

Overall, respondents had a good attitude toward lifestyle medicine. The vast majority (91%) significantly (p=0.000) agreed that physicians should apply lifestyle medicine services to every patient, and 65.6% significantly (p=0.000) thought that physicians should follow guidelines in repeating a lifestyle medicine test for a healthy individual when the test is negative at the first visit. Most respondents significantly practiced lifestyle medicine (p=0.000) by always advising patients about physical activities, a healthy diet, and quitting smoking (63.2%, 59%, and 64.6%, respectively).

Table 3 Knowledge, Attitudes & Practice towards Lifestyle Medicine

	Attributes	Categories	Frequency	Percent	
	How much scientific evidence do you know about lifestyle medicine you apply?	100%	18	8.5	
		75%	98	46.2	0.000
		50%	64	30.2	
		25%	32	15.1	
	Sources for knowledge about lifestyle medicine services	Evidence based medicine sources	66	31.1	
		Continuous medical education	35	16.5	
		Educational background	35	16.5	
		Work related materials for application or programs for implementation and adherence	30	14.2	-
		Scientific studies or literature	12	5.7	
		Colleagues advice	10	4.7	
		Social media or public newspaper and magazine	24	11.3	
Aspects of Participant's Knowledge	Do you update your knowledge about lifestyle medicine?	Yes, every 3 months	29	13.7	
		Yes, at least once a year	115	54.2	0.000
		Yes, every 3 to 5 years	26	12.3	
		No, I do not update my knowledge	42	19.8	
	In the last 3 years, did you take courses about delivering of lifestyle medicine services?	Yes, as a session in a conference or symposium	23	10.8	
		Yes, as a part of a bigger or review course that included other subjects	37	17.5	-
		Yes, as course, workshop or conference specific and designated to this topic	40	18.9	
		No, since this topic is rarely addressed by educational activities such as	45	21.2	

		courses or conferences			
		No, I didn't look for such educational activity for such purpose	67	31.6	
Aspects of Participant's Attitude	Physicians should apply lifestyle medicine services with every patient	Strongly agree	108	50.9	0.000
		Agree	85	40.1	
		Neutral	19	9.0	
	It is mandatory to take consent from patients before any lifestyle medicine service	Yes	74	34.9	0.712
		No	79	37.3	
		Do not know	59	27.8	
	Physicians should follow guidelines in repeating a lifestyle medicine test for a healthy individual when the test is negative at first visit	Yes	139	65.6	0.000
		No	23	10.8	
		Do not know	50	23.6	
Aspects of Participant's Practice	Advise to perform physical activities	Always	134	63.2	0.000
		Sometime	61	28.8	
		Rarely	11	5.2	
		Never	6	2.8	
	Advise to eat balanced diet	Always	125	59.0	0.000
		Sometime	68	32.1	
		Rarely	14	6.6	
		Never	5	2.4	
	Advise to quit smoking	Always	137	64.6	0.000
		Sometime	56	26.4	
		Rarely	7	3.3	
		Never	12	5.7	

Highly significant if p-value < 0.01, Significant if p-value < 0.05, Non significant if p-value > 0.05

Table 4 shows the associations of physicians' socio-demographics with knowledge update, attitude, and practice of lifestyle medicine. The female gender was more associated with knowledge updates (p=0.030) than the male gender. On the other hand, the 50-60 years age group was the most significantly associated with giving more advice to patients about physical activities (practice of lifestyle medicine), followed by the 30-40 years and 20-30 years age groups (p=0.000). Married (66.2%), divorcees (66.7%), and master's degree holders (62.5%) reported giving significantly more advice to patients to do physical activities (p=0.000 and p=0.030, respectively) compared to single respondents (54.5%) and diploma holders (40%).

Table 4 The associations of physicians' socio-demographics with knowledge update, attitude and practice of lifestyle medicine

		Do you update your knowledge about lifestyle medicine?				
		Yes, every 3 months	Yes, at least once a year	Yes, every 3 to 5 years	No, I do not update my knowledge	P-value
Gender	Male	14	50	19	25	0.030
		13.0%	46.3%	17.6%	23.1%	
	Female	15	65	7	17	
		14.4%	62.5%	6.7%	16.3%	

		Physicians should apply lifestyle medicine services with every patient			
		Strongly agree	Agree	Neutral	
		59.8%	31.0%	9.2%	
Job Title	General	51	55	11	0.081

Practitioner		43.6%	47.0%	9.4%	
Specialist		39	16	4	
		66.1%	27.1%	6.8%	
Consultant		18	14	4	
		50.0%	38.9%	11.1%	

		Advise patients to perform physical activities				
		Always	Sometime	Rarely	Never	
		67.3%	25.0%	4.8%	2.9%	
Age	20-30	28	15	1	0	0.000
		63.6%	34.1%	2.3%	0.0%	
	30-40	78	33	5	2	
		66.1%	28.0%	4.2%	1.7%	
	40-50	12	8	2	0	
		54.5%	36.4%	9.1%	0.0%	
	50-60	16	3	1	1	
		76.2%	14.3%	4.8%	4.8%	
	>60	0	2	2	3	
		0.0%	28.6%	28.6%	42.9%	
Marital Status	Never Married / Single	24	20	0	0	0.000
		54.5%	45.5%	0.0%	0.0%	
	Married	100	40	6	5	
		66.2%	26.5%	4.0%	3.3%	
	Divorced	10	0	4	1	
		66.7%	0.0%	26.7%	6.7%	
	Widow	0	1	1	0	
		0.0%	50.0%	50.0%	0.0%	
Highest Level of Education	MBBS	65	33	4	2	0.030
		62.5%	31.7%	3.8%	1.9%	
	Diploma	2	1	1	1	
		40.0%	20.0%	20.0%	20.0%	
	Master Degree	5	2	0	1	
		62.5%	25.0%	0.0%	12.5%	
	PhD Degree	4	1	2	1	
		50.0%	12.5%	25.0%	12.5%	
	Board Certified	58	24	4	1	
		66.7%	27.6%	4.6%	1.1%	

Highly significant if p-value < 0.01, Significant if p-value < 0.05, Non significant if p-value > 0.05

Eating 4-5 servings of fruits (p=0.008), eating vegetables 3-5 days a week (p=0.028), with 5 servings of vegetables in one of those days (p=0.028) were significantly associated with more frequent update of knowledge of lifestyle medicine (Table 5). This implies that the update of knowledge increases the tendency of eating vegetables.

There was a significant association between a healthy diet and biological markers and a good attitude toward lifestyle medicine. The majority of respondents who consumed 3 and 4 servings of fruits (89.3% and 86.7%, respectively) (p=0.006), who rarely (92.1%) eat salty processed food (p=0.009), and who add too little amount of salt to the meal (100%) (p=0.007) agreed that physicians should apply lifestyle medicine services with every patient. Most of those with pre-diabetic (92.6%) levels (p=0.015) and normal LDL levels (97%) (p=0.002) also agreed that physicians should apply lifestyle medicine services to every patient.

Table 5 Identification Physical Activity Factors Associated with Knowledge

		Do you update your knowledge about lifestyle medicine?				Chi-square (P-value)
		Yes, every 3 months	Yes, at least once a year	Yes, every 3 to 5 years	No, I do not update my knowledge	
How many servings of fruit do you eat a day?	0	2	5	1	6	0.008
		14.3%	35.7%	7.1%	42.9%	
	1	8	41	8	17	
		10.8%	55.4%	10.8%	23.0%	
	2	12	39	7	11	
		17.4%	56.5%	10.1%	15.9%	
	3	4	15	6	3	
		14.3%	53.6%	21.4%	10.7%	
	4	2	9	2	2	
		13.3%	60.0%	13.3%	13.3%	
	5	1	4	2	1	
		12.5%	50.0%	25.0%	12.5%	
	6	0	0	0	1	
		0.0%	0.0%	0.0%	100.0%	
	7	0	2	0	1	
		0.0%	66.7%	0.0%	33.3%	
In a typical week, on how many days do you eat vegetables?	0	2	3	0	7	0.028
		16.7%	25.0%	0.0%	58.3%	
	1	0	9	1	5	
		0.0%	60.0%	6.7%	33.3%	
	2	10	11	7	3	
		32.3%	35.5%	22.6%	9.7%	
	3	5	23	5	5	
		13.2%	60.5%	13.2%	13.2%	
	4	4	21	6	5	
		11.1%	58.3%	16.7%	13.9%	
	5	3	24	4	10	
		7.3%	58.5%	9.8%	24.4%	
	6	3	9	3	3	
		16.7%	50.0%	16.7%	16.7%	
	7	2	15	0	4	
		9.5%	71.4%	0.0%	19.0%	
How many servings of vegetables do you eat on one of those days?	0	2	3	0	6	0.028
		18.2%	27.3%	0.0%	54.5%	
	1	8	27	8	12	
		14.5%	49.1%	14.5%	21.8%	
	2	9	42	9	7	
		13.4%	62.7%	13.4%	10.4%	
	3	6	25	2	8	
		14.6%	61.0%	4.9%	19.5%	
	4	3	8	2	3	
		18.8%	50.0%	12.5%	18.8%	

	1	6	4	1
5	8.3%	50.0%	33.3%	8.3%
6	0	1	1	0
	0.0%	50.0%	50.0%	0.0%
7	0	3	0	5
	0.0%	37.5%	0.0%	62.5%

Highly significant if p-value < 0.01, Significant if p-value < 0.05

Respondents who reported eating fruits 2 days a week (p=0.034), eating 2 servings of fruits on those days (p=0.000), never adding salt to the meal (p=0.000), and never eating processed salty food (p=0.000) were more significantly likely to always advise patients to perform physical activities (77.5%, 69.6%, 80.0%, 76.9%, respectively). In addition, having normal hemoglobin A1C (p=0.000) and normal cholesterol (p=0.000) levels was significantly associated with more constant advice to the patient to perform physical activities (72.6% and 71.6%, respectively).

4. DISCUSSION

The PHC centers physicians in Saudi Arabia are the first contacts and health advisers for individuals and communities regarding their health problems. Their behaviors hugely impact people's health habits and lifestyles, influencing the status of diseases, especially non-communicable diseases, in the community and at the national level in general. In terms of lifestyle medicine which is interested in preventive healthcare and self-care practices, physicians' healthy lifestyle behaviors impact healthcare services. Therefore, this studyexplored the practice of healthy lifestyle behaviors and lifestyle medicine among PHC centers physicians in Jeddah, Saudi Arabia.

Results showed that generally, most physicians practiced healthy behaviors, with around two-thirds doing physical exercises (moderate and vigorous), such as brisk walking, swimming, cycling continuously up to carrying a heavy load, and running for at least 10 minutes. However, a large number (around 42%) reported no physical exercise. Around a third exercised for 30 minutes and more. These findings are consistent with the study conducted in Bahrain, which reported that 29.6% of physicians performed physical exercises for at least 30 minutes a week. In that study, only 13% exercised 5 days a week (Borgan et al., 2015), less than 15% of our study participants who exercised for 4 days a week but more than 12.3% of our study participants who exercised 5 days a week. These also indicate that the levels of physical exercise among physicians in Jeddah PHC centers are very low since the recommended period of moderate and vigorous physical activities should be at least 150 minutes. A study from the United States of America (USA) also found poor exercises among both attending physicians and resident doctors (Howe et al., 2010).

Poor physical activities are known to lead to different chronic diseases and obesity. Saudi Arabia is one of the countries with a high prevalence of obesity and other related chronic diseases (Althumiri et al., 2021). Our study revealed that 61.7% of physicians had a BMI> 25, with a third (30.6%) of physicians being obese (BMI>30). Moreover, most chronic diseases reported were hyperlipidemia/dyslipidemia, hypertension, and diabetes mellitus. Similarly, previous studies showed that 63.2% of physicians at 3 PHC centers of National Guard Health Affairs in Jeddah were overweight and obese, with similar chronic diseases (Alshareef et al., 2019) as found in our study. A study involving 234 physicians in the Jazan region, Saudi Arabia, similarly found that the majority (70%) were obese and overweight and exercised at low intensity (Gosadi et al., 2020). Though similar chronic diseases were reported among physicians in Bahrain, overweight and obesity presented among 72.5% of Bahraini physicians (Borgan et al., 2015). Our findings indicate that obesity and associated diseases are concerning among physicians in Jeddah, similar to the general population.

The majority of our respondents reported eating fruits and vegetables 2-5 days a week. While this may be the routine practice of healthy eating, it may also indicate efforts for weight control. This is supported by a previous study indicating that 40.6% of physicians were on a diet to reduce weight (Alshareef et al., 2019). Another study from China also reported similar fruit and vegetable consumption habits as well as the association with the quality of life (Kwon & Park, 2016). Better quality of life was found to be associated with vegetable consumption among physicians in Madinah, Saudi Arabia (Aljohani & Al-Zalabani, 2021). The majority of our study respondents reported eating salty meals and processed food. While busy hospital work schedules might encourage physicians to opt for processed food (easy and ready to consume), this could contribute to obesity and the high prevalence of chronic diseases, as revealed by the literature (Machado et al., 2020; Zhong et al., 2021).

When assessed about lifestyle medicine knowledge, only 8.5% of respondents thought they knew 100% scientific evidence about lifestyle medicine, while less than a half and a third thought they had 75% and 50% of practical lifestyle medicine knowledge,

respectively. This indicates insufficient knowledge of lifestyle medicine, which impedes its practice in clinical medicine. This may be because of the lack of incorporation of lifestyle medicine in medical education. Medical curricula usually provide shallow education on diet, physical activity, and prevention (Clarke & Hauser, 2016). The most common information sources about lifestyle medicine reported were; evidence-based medicine sources among a third of our study participants, medical education, and medical background (both 16.5%). This indicates a scarcity of information sources, which may hinder the practice of lifestyle medicine. The lack of training in lifestyle medicine makes physicians unconfident in advising patients and unable to practice healthy habits for themselves (Clarke & Hauser, 2016; Howe et al., 2010). This evidence is supported by our study findings that only around a half of respondents updated their knowledge at least once a year (54.2%), with only 36.4% who had taken a course about lifestyle medicine during the past 3 years, and 21.2% who didn't, citing the rarity of courses about lifestyle medicine as the reason.

Medical education often focuses on treatments and trains doctors to perform treatment-focused clinical practice, discouraging physicians from practicing and being aware of lifestyle medicine, thus which might explain why a third of our study participants didn't look for information to update their knowledge. Despite being disadvantaged, around 60% of respondents reported always advising patients about physical activities, a healthy diet, and quitting smoking. This indicates a good attitude toward lifestyle medicine and is supported by our findings that the vast majority (91%) agreed that physicians should apply lifestyle medicine services to every patient, and 65.6% thought that physicians should follow guidelines in repeating a lifestyle medicine test for a healthy individual when the test is negative at the first visit. Therefore, there is a need to integrate more extensive lifestyle medicine courses in medical education curricula since physicians seem interested in applying them in their clinical practice. Consistent with this interest and the necessity, the lifestyle fellowship program was recently established in Saudi Arabia in 2022 to increase specialized physicians in lifestyle medicine to help enhance the lifestyles of its citizens and prevent diseases, reducing costs spent on healthcare (Wilf Miron et al., 2019). In addition to improving healthy behaviors for the general population, it will encourage physicians to practice healthy behaviors and give them knowledge of lifestyle medicine principles to apply in their clinical practices.

Our study showed that female physicians were more likely to update their knowledge than males. Women are generally more concerned about body image, especially weight, than men, and this might lead to constant updating of knowledge about body weight control, which is one of the key principles of lifestyle medicine. Moreover, it was evidenced that male physicians are more risk-takers, prompting them to engage in unhealthy and risky behaviors and less enthusiasm about a healthy lifestyle compared to female physicians (Wilf Miron et al., 2019). The willingness to control body weight leading to staying updated could be the reason we found that eating more fruits and vegetables for more days a week was significantly associated with more frequent updates of knowledge of lifestyle medicine, implying that the update of knowledge increases the tendency of eating vegetables.

Moreover, a study conducted in the USA found that physicians who were more likely to have better knowledge of lifestyle medicine also tend to eat more vegetables and fruits, have their hemoglobin A1C and cholesterol levels regularly checked, exercise more days for more minutes and apply lifestyle medicine concepts more in their practice (Howe et al., 2010). This is consistent with our study findings that the majority of physicians with healthy eating habits (more vegetables, fruits, less salt, rarely eating processed food) agreed that physicians should apply lifestyle medicine services to every patient. Since they are more likely to healthy behaviors, it may explain why those who greed that physicians should apply lifestyle medicine services to every patient had mostly pre-diabetic hemoglobin A1C levels, normal LDL levels, and normal cholesterol and were most likely to advise patients to perform physical activities. Health diet among American and Canadian physicians was reported to be associated with effective counseling about positive behavioral changes (Bazargan et al., 2009). Another study done in the USA found physicians who were obese couldn't give effective advice to patients about a healthy lifestyle (Magnavita, 2007).

Physicians aged 50-60 years, married, divorced, and holding master's degrees were more likely to counsel patients about physical activities, attitude, and practice of lifestyle medicine than younger, single, and MBBS holders. This is expected since physicians with master's degrees tend to have knowledge beyond treatment-focused patient care. Most prevention-related programs, including lifestyle medicine, are in postgraduate studies physicians with only MBBS have not yet learned. In addition, master's degree holders are more experienced and have been exposed to different patient management approaches. This experience that influences the application of lifestyle medicine principles might be the reason advice to patients to exercise increased with the age of the physicians. The advanced age may have led to more likelihood of being married (still in marriage or divorced) among physicians who practice lifestyle medicine.

Our findings align with previous studies that indicated that older age was associated with advising patients about changing behaviors and practicing healthy habits, such as exercising and healthy dieting (Howe et al., 2010). It was established that attending physicians, who tend to have postgraduate degrees, are also more likely to practice healthy behaviors (Siddiqui et al., 2021) and apply lifestyle medicine compared to resident physician trainees (Howe et al., 2010). However, we didn't find any statistically

significant difference among general practitioners, specialists, and consultants regarding the attitude toward lifestyle medicine. We used an online cross-sectional study design prone to selection bias, over-and under-estimation, as well as limited identification of associations between exposures and outcomes due to simultaneous measurement of both exposure and outcome variables. Our sampling method maximizes the generalization of our results and minimizes limitations. However, longitudinal offline studies are recommended to confirm our findings.

5. CONCLUSION

Our study indicated that physicians practiced some healthy behaviors, such as a healthy diet but poorly performed physical exercises under the recommended levels. Generally, health status check-up was poor, and physicians had poor knowledge of lifestyle medicine. Most had no updated knowledge, and the main challenge was the lack of training, courses, and other information sources. Despite these challenges, most physicians had good attitudes towards lifestyle medicine and tried to apply it during clinical practices. Physicians with more healthy eating habits were more likely to have a good attitude, update knowledge, and practice lifestyle medicine. Older age, being married, divorced, female and having higher education levels were associated with more knowledge updates and practice of lifestyle medicine.

Our study findings highlight the need for adjusting medical education programs to incorporate lifestyle medicine concepts and promote prevention-based clinical practice ensuring the prevention and elimination of lifestyle causes of diseases in addition to treatments. The physicians in practice should also be trained in lifestyle medicine and encouraged to practice healthy behaviors. In the context of Saudi Arabia's heavy burden of lifestyle-related diseases, promoting healthy behaviors among physicians and applying lifestyle medicine principles in clinical practices will positively impact healthcare services, and outcomes for patients, while reducing costs and improving wellbeing of Saudi citizens.

Authors' contributions
Bassam A. Alhejaili designed the study's conceptual framework and drafted the research proposalalso did data collection and analysis. Then he wrote the manuscript draft.
Hani S. Almugti contributed to designing the study's conceptual frameworkand supervised the research conduction.

Ethical approval
The study was approved by the Medical Ethics Committee of the Research Committee of the Saudi preventive medicine program in Jeddah and the ethical research committee (IRB) of the health directorate in Jeddah, Saudi Arabia (Ethical approval code: A01386).

Conflicts of interest
The authors declare that there are no conflicts of interests.

Data and materials availability
All data associated with this study are present in the paper.

REFERENCES AND NOTES

1. Al Shahrani AS, Almudaiheem NR, Bakhsh EM, Sarhan NT, Aldossari FS, bin Huzeim BA. Understanding Smoking Behavior among Physicians in Riyadh, Saudi Arabia: A Cross-Sectional Study. Tob Use Insights 2021; 14:1179173X 2110066. doi: 10.1177/1179173X211006652

2. Aljohani AM, Al-Zalabani AH. Lifestyle factors and quality of life among primary health care physicians in Madinah,

Saudi Arabia. Saudi J Biol Sci 2021; 28(8):4732-4737. doi: 10.1016/j.sjbs.2021.04.087

3. Alshareef SJ, Alzahrani A, Farahat FM. Lifestyle habits and well-being among primary health physicians in western Saudi Arabia. J Public Health 2019; 27(1):57-62. doi: 10.1007/s10389-018-0929-1

4. Althumiri NA, Basyouni MH, AlMousa N, AlJuwaysim MF, Almubark RA, BinDhim NF, Alkhamaali Z, Alqahtani SA. Obesity in Saudi Arabia in 2020: Prevalence, Distribution, and Its Current Association with Various Health Conditions. Healthcare 2021; 9(3):311. doi:10.3390/healthcare9030311

5. Bazargan M, Makar M, Bazargan-Hejazi S, Ani C, Wolf KE. Preventive, Lifestyle, and Personal Health Behaviors among Physicians. Acad Psychiatry 2009; 33(4):289-295. doi: 10.1176/appi.ap.33.4.289

6. Borgan SM, Jassim GA, Marhoon ZA, Ibrahim MH. The lifestyle habits and wellbeing of physicians in Bahrain: a cross-sectional study. BMC Public Health 2015; 15(1):655. doi:10.1186/s12889-015-1969-x

7. CDC. How Much Physical Activity Do Adults Need? Center for Disease Control and Prevention. https://www.cdc.gov/physicalactivity/basics/adults/index.htm?CDC_AA_refVal=https%3A%2F%2Fwww.cdc.gov%2Fphysicalactivity%2Feveryone%2Fguidelines%2Fadults.html

8. Clarke CA, Hauser ME. Lifestyle Medicine: A Primary Care Perspective. J Grad Med Educ 2016; 8(5):665-667. doi: 10.4300/JGME-D-15-00804.1

9. Gosadi I, Daghriri K, Majrashi A, Ghafiry HS, Moafa RJ, Ghazwani MA, Bahari AY, Ajeebi RE, Zurayyir AJ, Jarab F, Bahri AA, Ryani MA, Salim AM. Lifestyle choices and prevalence of chronic noncommunicable diseases among primary healthcare physicians in the Jazan Region, Saudi Arabia. J Fam Med Prim Care 2020; 9(11):5699. doi: 10.4103/jfmpc.jfmpc_1472_20

10. Helal HEB, El-Awady MA. Egyptian physicians' lifestyle behaviors and health promotion activities towards patients with chronic non-communicable diseases. Medical Science 2022; 26:ms102e2071. doi: 10.54905/disssi/v26i121/ms102e2071

11. Hidalgo KD, Mielke GI, Parra DC, Lobelo F, Simões EJ, Gomes GO, Florindo AA, Bracco M, Moura L, Brownson RC, Pratt M, Ramos LR, Hallal PC. Health promoting practices and personal lifestyle behaviors of Brazilian health professionals. BMC Public Health 2016; 16(1):1114. doi: 10.1186/s12889-016-3778-2

12. Howe M, Leidel A, Krishnan SM, Weber A, Rubenfire M, Jackson EA. Patient-Related Diet and Exercise Counseling: Do Providers' Own Lifestyle Habits Matter? Prev Cardiol 2010; 13(4):180-185. doi: 10.1111/j.1751-7141.2010.00079.x

13. Kwon OY, Park SY. Specialty choice preference of medical students according to personality traits by Five-Factor Model. Korean J Med Educ 2016; 28(1):95-102. doi: 10.3946/kjme.2016.14

14. Machado PP, Steele EM, Levy RB, da Costa Louzada ML, Rangan A, Woods J, Gill T, Scrinis G, Monteiro CA. Ultra-processed food consumption and obesity in the Australian adult population. Nutr Diabetes 2020; 10(1):39. doi: 10.1038/s41387-020-00141-0

15. Magnavita N. The unhealthy physician. J Med Ethics 2007; 33(4):210-214. doi:10.1136/jme.2006.017533

16. Martinez C, Bacigalupe G, Cortada JM, Grandes G, Sanchez A, Pombo H, Bully P. The implementation of health promotion in primary and community care: a qualitative analysis of the 'Prescribe Vida Saludable' strategy. BMC Fam Pract 2017; 18(1):23. doi: 10.1186/s12875-017-0584-6

17. Oberg E, Frank E. Physicians' health practices strongly influence patient health practices. J R Coll Physicians Edinb 2009; 39(4):290-291. doi: 10.4997/JRCPE.2009.422

18. Siddiqui AS, Siddiqui Z, Khulsai R, Jawaid M. Lifestyle Habits and Wellbeing among Physicians in Pakistan: A Cross-Sectional Study. Cureus 2021. doi: 10.7759/cureus.14875

19. Wilf Miron R, Malatskey L, Rosen LJ. Health-related behaviours and perceptions among physicians: results from a cross-sectional study in Israel. BMJ Open 2019; 9(9):e031353. doi: 10.1136/bmjopen-2019-031353

20. Zhong GC, Gu HT, Peng Y, Wang K, Wu YQL, Hu TY, Hu FC, Hao FB. Association of ultra-processed food consumption with cardiovascular mortality in the US population: long-term results from a large prospective multicenter study. Int J Behav Nutr Phys Act 2021; 18(1):21. doi: 10.1186/s12966-021-01081-3