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RESEARCH ARTICLE

PERCEIVED EFFECT OF PHYSICAL EXERCISE ON SMOKING STATUS AMONG SAUDI POPULATION IN THE EASTERN PROVINCE OF KSA: A CROSS-SECTIONAL STUDY

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Abstract

Background: Smoking is a well-known risk factor for heart and lung disease and one of the most common causes of lung cancer. Recently, more attention has been focused on interventions that can be utilized in smoking cessation programs including regular exercise. However, there is contradicting evidence regarding the effect of regular exercise on smoking habits and smoking cessation exist in the literature.
Aim: The study aims to evaluate the population's perception of the effect of regular exercise on smoking habits and its aid in smoking cessation in the Eastern Province.
Materials and Methods: This study was a quantitative cross-sectional analytical study for the Saudi population of the Eastern Province, KSA.
Results: The total number of respondents participating in this study was 235. The majority of them were male, had regular physical exercise, with a Bachelor's or Diploma educational level and aged 40 years or above. More than half of the participants were smokers and married.More than half of the sample reported that exercise decreases or strongly decreases smoking times and decreases or strongly decreases the desire to quit. Less than half of the participants perceived that exercise decreases the desire, enjoyment and symptoms. A statistically significant difference between educational level, smoking status and physical exercise of respondents and their perceived effect of physical exercise on smoking status was found. Also, there was a statistically significant difference between exercise duration, frequency per week and the perceived effect of physical exercise on smoking status.

Introduction:-

Smoking is a well-known predictor of cardiopulmonary diseases and a leading factor in lung carcinoma. The reduction of smoking habits has been the aim of many health programs and healthcare providers. To achieve this, many modalities have been implemented. Among those modalities is regular Exercise[1].

Background & literature review

In the literature, many studies have been conducted on adult smokers. Results of these studies suggest that physical activity may decrease smoking habits and withdrawal symptoms during the attempt to quit[2]. Based on that, it was suggested to utilize physical activities and prescribe them as part of smoking cessation interventions contributing to cessation sustainability over time[3].However, contradicting studies showed evidence of a low effect of physical

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exercise on smoking. Due to this contradicting evidence, it is interesting to further investigate the perception of the population of the effect of regular exercise on smoking cessation. This will further supportnationaland international studies in elaborating on this topic through understanding the population perception[4, 5].

In the literature, some international studies addressed the effect of exercise on smoking cessation. One study was conducted in West Virginia in 2011 to evaluate the effect of exercise on teen smoking cessation. That study concluded that adding physical activity to the not-on-tobacco program may enhance cessation, particularly in boys [6].Similarly, a study in the same region conducted to understand the physical activity outcomes among teen smoking cessation in 2013. In that study, the possibility of altering more than one health behavior among teens, particularly physical activity & smoking cessation was concluded[7].

Furthermore, the time-dependent relation between smoking cessation and improved exercise tolerance in apparently healthy middle-aged men and women in 2015 was conducted in Israel. In that study, an association between smoking cessation and improved exercise tolerance were evident within the first two years of abstinence [8].

Although many studies supported the positive association of exercise and smoking habits and smoking cessation, on the contrary, randomized meta-analysis study was conducted to explore the effect of exercise type on smoking cessation in Thailand in 2017. Contradicting to previous studies, there was no effect of aerobic exercise, resisted exercise, physical activity and combined aerobic and resisted exercise on smoking cessation in this study. However, at the end of treatment in the program where yoga plus cognitive-behavioral therapy (CBT) was used, a positive effect on smoking cessation was found[3, 9].

Among the local studies conducted, a study was conducted in Riyadh medical city in the Kingdom of Saudi Arabia (KSA) on the prevalence and predictors of physical exercise among nurses in **2017**.It was concluded from that study that smoking and obesity were significant predictors associated with physical inactivity[10].Moreover, another local study was conducted at King Saud University in KSA exploring exercise interventions. This study suggested physical exercise as a protective modulator against metabolic disorders in cigarette smokers in 2016.Findings revealed that exercise interventions of variable intensities may be used as nicotine replacement therapy or protective aids against smoking-related cardiopulmonary disorders[11].

Study rationale

Based on the literature evidence, there is a clear link between physical exercise and smoking status. However, some studies supported that physical exercise can be used as an intervention for smoking cessation while other studies contradicted this conclusion that there is no relation between the two. Therefore, exploring the perception of the general population on the effect of physical exercise on smoking habits and cessation might reveal interesting results. This study aims to conduct further research to explore the perception population on the effect of physical exercise on the smoking habit and the aid in smoking cessation in addition to exploring the factors that affect the population perception.

Aim of the study:-

The study aims to evaluate the population's perception of the effect of regular exercise on smoking habits and its aid in smoking cessation in addition to the factors affecting it, in the eastern province of KSA.

Objectives:-

Main Objective:

The main objective of the study was to describe the perceived effect of exercise on smoking cessation among the general population in the Eastern Province of the Kingdom of Saudi Arabia.

Specific Objectives:

To investigate the factors affecting the perception of exercise effect on smoking cessation.

Material and Methods:-

Study design, area, and population:
This study was a quantitative cross-sectional study conducted on the Saudi population of the Eastern Province of the Kingdom of Saudi Arabia including Qatif Health Network, Dammam Health Network, and Rural Health Network.

Eligibility criteria:
Inclusion criteria: any male or female above 18 years old.

Exclusion criteria:
Candidates excluded from the study were:
1. Younger than 18 years old.
2. Non-Saudi nationality.

Sample size:
A total of 235 respondents were collected through convenient sampling.

Data collection tool and technique:
A questionnaire was developed to explore the study objectives. It included sections on demographic factors, smoking habits (characteristics), physical exercise characteristics, and the perceived effect of exercise habits on smoking habits and smoking cessation. The questionnaire was reviewed and validated by two experienced consultants. A pilot study was conducted before data collection to further refine the questionnaire. The questionnaire was developed into an electronic questionnaire and was distributed among respondents of the general population through electronic social media platforms. The data were collected in June 2022.

Study variables:
Dependent variable:
The perception of the effect of physical exercise on current smoking status, smoking frequency, number of cigarettes per day, the pleasure of smoking, side effects of smoking, and willingness to quit smoking.

Independent variables:
Age, gender, educational level, smoking modality, anti-smoking intervention usage, type of exercise: aerobic, anaerobic, or both.

Statistical Analysis:
All data were analyzed using SPSS for Windows software (ver. 21.0; SPSS Inc., Chicago, IL). Descriptive statistics were conducted on the population. A P-value of less than 0.05 was considered significant.

Ethical considerations
An Institutional Review Board (IRB) approval was obtained from Family Medicine Academy with an effort to obtain it from the higher authorities as well (Health Network IRBs). Consent was obtained from participants as a section at the beginning of the questionnaire to consent to participate in the study. Also, a statement was added declaring that data will be confidential, not utilized for any other purpose than the study and only those involved in the study will have access to the data.

Budget
It's a self-funded study.

Results:-

Demographic characteristics of respondents:
The total number of respondents participating in this study was 235. The majority of them were male (90.2%), had regular physical exercise (75.5%), Bachelor's or Diploma educational level (71.5%), and were aged 40 years or above (77.1%). More than half of the participants were smokers and married (60.4% and 63% respectively) as described in **(Table, 1).**

Characteristics of smokers of physical exercise and smoking of the respondents:
The highest percentage of the sample (75.3%) smokes more than 10 cigarettes per day and start smoking more than 10 years (70.6%). About half of the respondents (50.6%) exercise for 45 minutes to two hours every time, while less than half of the sample (45.5%) do cardiorespiratory exercises and exercise 4 times or more every week (34.4%) as shown in **table 2**.

Perceived effect of physical exercise on smoking status among respondents:
Table 3 presents the perceived effect of physical exercise on smoking status among respondents. More than half of the sample (53.2%) reported that exercise decreases or strongly decreases smoking times. About half of the sample (48.1%) said that exercise decreases or strongly decreases the desire to quit. Less than half of the participants perceived that exercise decreases the desire, enjoyment, and symptoms (43.8%, 37.4%, and 34.9% respectively).

Table (1): -Demographic characteristics of the respondents, (n = 235).

Variables	Frequency	Percent (%)
Age (years)		
18-30	104	44.3
31-40	77	32.8
41-50	35	14.9
51-60	19	8.1
Mean ± SD	33 ± 10.0	
Gender		
Male	212	90.2
Female	23	9.8
Marital status		
Married	148	63.0
Single/divorced	87	37.0
Education level		
Secondary school or less	52	22.1
Bachelor/diploma	168	71.5
High education (PhD)	15	6.4
Smokers		
Yes	142	60.4
No	65	27.7
Ex-smokers	28	11.9
Do you have regular physical activity?		
Yes	178	75.5
No	57	24.3

Factors affecting Perception:
Association between characteristics and perceived effect of physical exercise on smoking status among respondents

The Association between characteristics and perceived effect of physical exercise on smoking status among respondents was demonstrated in **table 4**. There was a statistically significant difference between the educational level, smoking status, and physical exercise of respondents and their perceived effect of physical exercise on smoking status ($p \leq 0.05$). A higher percentage of participants who do physical exercise (82.5%) reported that exercise decreases smoking with a statistically significant difference than others ($p = 0.027$). Smokers and ex-smokers were significantly higher in their perception; that exercise decreases smoking; than nonsmokers (76.7%, $p = 0.004$). Similarly, Bachelor's or Diploma levels of education were significantly higher than other levels of education (76.7%, $p = 0.001$).

Association between smoking and physical exercise characteristics and perceived effect of physical exercise on smoking status among respondents.

There was a statistically significant difference between how long participants exercised every time, how many times they exercise per week, and their perceived effect of physical exercise on smoking status ($p \leq 0.05$). Those who exercise for 45 minutes to 2 hours were significantly higher in their perception; that exercise decreases smoking; than others (72.9%, p=0.000). Moreover, more than half of the participants (51.7%) who exercise 4 times or more per week perceived that exercise decreases smoking with a statistically significant difference from others (p=0.001) as shown in **table 5**.

Table (2): -Characteristics of physical exercise and smoking of the respondents, (n=235).

Variables		Frequency	Percentage (%)
How many times do you exercise per week?	No exercise	57	24.3
	Less than twice	44	18.7
	2 to 3 times	53	22.6
	4 to 5 times	56	23.8
	6 to 7 times	25	10.6
How long do you exercise every time?	No exercise	57	24.3
	less than 45 minutes	54	23.0
	45 minutes to 2 hours	119	50.6
	More than 2 hours	5	2.1
What kind of activity do you exercise?	No exercise	57	24.3
	cardiorespiratory exercises	107	45.5
	resistance exercises	9	3.8
	Both	61	26.0
When did you start smoking	10 years or less	69	29.4
	More than 10 y	166	70.6
How many cigarettes do you smoke/day	10 or less	58	24.7
	More than 10	177	75.3

Table (3): -Perceived effect of physical exercise on smoking status among respondents, (n = 235):

Question	Choice	Frequency	Percentage (%)
In your opinion, does exercise have any effect on smoking?	Yes, it increases the desire	28	11.9
	Yes, it decreases the desire	103	43.8
	No effect/ not sure	104	44.3
In your opinion, does exercise have any effect on smoking times?	Strongly increase / Increase	33	14.0
	Strongly decrease / Decrease	125	53.2
	No effect /not sure	77	32.8
In your opinion, does exercise have any effect on smoking joy?	Strongly increase / Increase	52	22.1
	Strongly decrease / Decrease	88	37.4
	No effect /not sure	95	40.4
In your opinion, does exercise have any effect on smoking symptoms?	Strongly increase / Increase	81	34.5
	Strongly decrease / Decrease	82	34.9

	No effect /not sure	72	30.6
In your opinion, does exercise have any effect on smoking cessation?	Strongly increase / Increase	50	21.3
	Strongly decrease / Decrease	113	48.1
	No effect /not sure	72	30.6

Table (4): - Association between characteristics and perceived effect of physical exercise on smoking status among respondents.

Variables		**In your opinion, does exercise have any effect on smoking?(F, %)**			**Chi-square (p value)**
		Increase smoking	**Decrease smoking**	**No effect/ not sure**	
Age (years)	18-30	17 (60.7)	41 (39.8)	46 (44.2)	6.442 (0.375)
	31-40	7 (25.0)	37 (35.9)	33 (31.7)	
	41-50	4 (14.3)	17 (16.5)	14 (13.5)	
	51-60	0	8 (7.8)	11 (10.6)	
Gender	Male	28 (100.0)	92 (89.3)	92 (88.5)	3.492 (0.174)
	Female	0	11 (10.7)	12 (11.5)	
Marital status	Married	21 (75.0)	70 (68.0)	57 (54.8)	5.81 (0.055)
	Single/divorced	7 (25.0)	33 (32.0)	47 (45.2)	
Educational level	Secondary school or less	14 (50.0)	20 (19.4)	18 (17.3)	18.007 (0.001*)
	Bachelor/diploma	11 (39.3)	79 (76.7)	78 (75.0)	
	High education (PhD)	3 (10.7)	4 (3.9)	8 (7.7)	
Smoking status	Yes	22 (78.6)	60 (58.3)	60 (57.7)	15.332 (0.004*)
	Ex-smoker	3 (10.7)	19 (18.4)	6 (5.8)	
	No	3 (10.7)	24 (23.3)	38 (36.5)	
Physical exercise	Yes	23 (82.1)	85 (82.5)	70 (67.3)	7.23 (0.027*)
	No	5 (17.9)	18 (17.5)	34 32.7)	

*Statistically significant difference (p value ≤ 0.05)

Table (5): - Association between smoking and physical exercise characteristics and perceived effect of physical exercise on smoking status among respondents.

Variables		**In your opinion, does exercise have any effect on smoking?(F, %)**			**Chi-square (p value)**
		Increase smoking	**Decrease smoking**	**No effect/ not sure**	
How many times do you exercise per week?	Less than twice	14 (60.9)	14 (16.5)	16 (22.9)	21.532 (0.001*)
	2 to 3 times	5 (21.7)	27 (31.8)	21 (30.0)	
	4 to 5 times	2 (8.7)	33 (38.8)	21 (30.0)	
	6 to 7 times	2 (8.7)	11 (12.9)	12 (17.1)	
How long do you exercise every time?	less than 45 minutes	16 (69.6)	22 (25.9)	16 (22.9)	21.624 (0.000*)
	45 minutes to 2 hours	6 (26.1)	62 (72.9)	51 (72.9)	
	More than 2 hours	1 (4.3)	1 (1.2)	3 (4.3)	
What kind of activity do you exercise?	cardiorespiratory exercises	19 (82.6)	47 (56.0)	41 (58.6)	5.837 (0.212)
	resistance exercises	0	5 (6.0)	4 (5.7)	

	Both	4 (17.4)	32 (38.1)	25 (35.7)	
When did you start smoking	10 years or less	8 (28.6)	28 (27.2)	33 (31.7)	0.525 (0.769)
	More than 10 y	20 (71.4)	75 (72.8)	71 (68.3)	
How many cigarettes do you smoke/per day	10 or less	6 (21.4)	28 (27.2)	24 (23.1)	0.651 (0.722)
	More than 10	22 (78.6)	75 (72.8)	80 (76.9)	

Discussion:-

The majority of associations between risk factors for leading a lifestyle are favorable, particularly those between smoking and other factors. Smoking, a poor diet, and a lack of physical activity are the three main factors that can be prevented from causing morbidity and mortality but do not affect the population equally[6]. Through a variety of mechanisms, exercise may improve smoking-specific self-efficacy. Exercise participation and maintenance can boost confidence in initiating and maintaining other complex health behaviors.

This study was conducted to evaluate the population's perception of the effect of regular exercise on smoking habits and its aid in smoking cessation in the Eastern Province. Our study identified thatthe educational level in correlation with the routine physical exercise, as the most important motivating factor to quit smoking. One of the study's strengths was the large and diverse sample of adults, which allowed us to assess the effect of demographic status modification (i.e. gender, age, and educational level). Another plus was the wide range of physical activity evaluated in this sample, as well as the development of a new method for assessing the relationship between smoking and physical activity.

The results of demographic data related to gender show that of 235 respondents, 90% were males and that the physical activity component reduced the risk of boys continuing to smoke by fourfold. This finding is consistent with evidence that physical activity both prevents and increases youth smoking rates[12].Moreover, most of them (44.3%) were between 18-30 years old, married (63%), smokers (60%), and have regular physical activity (75.5%) of participants.

Our results related to the educational level revealed that (71.5%) of the population were bachelor's degree holders, also there was a statistically significant difference between the educational level, smoking status, and physical exercise. These results were similar to several authors'[5, 13], conclusions as they have proposed that the level of education may moderate the relationship between physical activity and smoking. For example, education level and physical activity have a strong positive relationship.Whereaseducation level and smoking are inverselyrelated.

Regarding, the smoking status and physical exercise our results revealed that a higher percentage of participants who do physical exercise (82.5%) reported that exercise decreases smoking, these findings are in great similarity with a study conducted by Heydariet al. (2015) as this study discovered a link between cigarette smoking and physical inactivity, with smokers exercising less than non-smokers[14].In addition, anotherstudy byMcGovern (2013), also showed that physical activity reduced the likelihood of smoking by adolescents[15].On the other hand, many articles indicate that smoking and physical activity levels are inversely related. Though rarely tested, several intriguing explanations for the negative relationship have been proposed. The most widely held belief is that positive and negative health behaviors simply cluster together. Smokers are more likely than nonsmokers to engage in other risky behaviors, and this is also true for heavy smokers versus lighter smokers[16, 17].

Furthermore, the difference between how long participants exercised every time, how many times they exercise per week, and their perceived effect of physical exercise on smoking status our study results demonstrated that those who exercise for 45 minutes to 2 hours exercise decreased smoking; then others about (72.9%). According to previous research, smokers spend significantly less time on sports, leisure, and aerobic activities than nonsmokers. According to a large cross-sectional survey conducted in Germany, smokers with a high level of nicotine dependence engage in less physical activity[18].

Furthermore, our findings are consistent with the findings of a study conducted by Horn et al, (2013), which found that teens who increased the number of days in which they received at least 20 minutes of exercise were significantly more likely to reduce their daily cigarette use. Otherwise, these findings are opposed to what smoking cessation programs typically recommend. According to the American Cancer Society, the Australian Cancer Council, and the Centers for Disease Control, these range from 8 to 14 attempts[19].

This study's findings are subject to some limitations.Wedid not include in our study some important variables such as race, income, family history, underlying diseases, and so on. As a result, these factors may influence the trends described in this report.

Conclusion:-

In conclusion, our research found a strong, negative, and independent relationship between cigarette smoking and physical activity in a representative sample of Saudis. We also discovered a strong link between cigarette smoking and certain demographic characteristics. Combating the smoking epidemic is an urgent priority due to the strong link between smoking and several well-established risk factors for morbidity and mortality. Our findings indicate that encouraging people to spend the majority of their time in appropriate positions and encouraging exercise may be an important mechanism for preventing smoking habits among the Saudi population.

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