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Research Article

FACTORS THAT CAUSE MEMORY IMPAIRMENT AMONG MEDICAL STUDENTS IN TAIBAH UNIVERSITY AT MEDINA, SAUDI ARABIA

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Abstract

Background: Memory, is one of the most fascinating mental capacities for encoding, storing and recalling information. The memory loss is a problem that affects most people. Levels of mental health and well-being difficulties have been found to be high amongst students, with up to 29% of students reporting clinical levels of distress. Medical education can impose significant psychological stress on undergraduates. There are many causes of memory loss, whether it's an occasional forgetfulness or loss of short-term memory that interferes with daily life. Memory problems can be caused by several conditions, including: Brain injuries, dehydration, depression, anxiety, stress, Lack of oxygen to the brain, sleep deprivation, hyperthyroidism or hypothyroidism or even epilepsy and seizures.

Aim: In our research, we aimed to study the effect of different factors on memory among medical students.

Materials and methods: This was a cross sectional study carried out on 423 medical students at Taibah University in Medina, Saudi Arabia during June 2018. Ethical approval was obtained from the scientific research ethics committee at Taibah University prior to implementing the study. An electronic questionnaire was collected from medical students from all years and specialties. The data analysis was done by using statistical package for the social sciences (SPSS) version 22.0.

Results: In the total sample ($n = 423$), a positive correlation between specific diet and low score memory was found, Sig. (2-tailed) = .008. Use of smart phone was shown to be negatively correlated with high memory score (pearson correlation = -.085). Sleep problem variable $F = 3.592$ was sig at $\alpha \leq 0.05$.

Conclusion: In our research a positive correlation was found between dietary intake, sleeping habits, smart phones and memory affection is found. Establishing more researches and campaigns at malls, schools, universities and hospitals to increase the awareness among public about these factors are needed for a better quality of life.

Keywords: Memory, Impairment, Factors, Score, Students

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INTRODUCTION:

Memory, is one of the most fascinating mental capacities for encoding, storing and recalling information [1]. The memory loss is a problem that affects most people, to a degree. Levels of mental health and well-being difficulties have been found to be high amongst students, with up to 29% of students reporting clinical levels of distress [2]. Medical education can impose significant psychological stress on undergraduates [3].

There are many causes of memory loss, whether it's an occasional forgetfulness or loss of short-term memory that interferes with daily life. Memory problems can be caused by several conditions, including: Brain injuries, dehydration, depression, anxiety, stress, Lack of oxygen to the brain, sleep deprivation, hyperthyroidism or hypothyroidism or even epilepsy and seizures [4].

Smoking also affect memory. Studies have shown that people who smoke find it more difficult to remember names than non-smokers [4]. Those who both smoke and drink alcohol have an impaired ability to think quickly and efficiently. These people show more cortical thinning in the frontal region of the brain – a region of the brain that is important for memory [5].

Good nutrition including high-quality proteins and fats is important to proper brain function. Deficiencies in vitamin B1 and B12 specifically can affect memory [4]. Obesity has been associated with impaired executive functions including working memory. Working memory was significantly and similarly impaired in both overweight and obese individuals compared to the healthy weight group [6]. Research has also shown that components of working memory, such as vigilance and decision-making, can be affected negatively by acute sleep loss [7]. Exercise can positively impact cognitive functioning and may represent an effective strategy to improve memory in those who have begun to experience cognitive decline [8].

Anxiety disorders can promote a crippling focus upon negative life-events and make concentration difficult, which can lead to problems in both social and work environments. In such situations the state of anxiety can be seen as maladaptive [9].

This research was focused on preventable causes that affect memories and interfere with the daily life of students.

Aim:

Our aim of study was to identify the most important factors that affect the memory of medical students and their educational performance.

METHODOLOGY:**Ethical approval**

Ethical approval was obtained from the scientific research ethics committee at Taibah University prior to implementing the study.

Informed consent was obtained voluntarily from students after explaining the aim and nature of the study. Privacy and confidentiality were assured.

Study Design and Setting

This cross-sectional analytical study was conducted among medical students of Taibah University at Medina, Saudi Arabia. The study was carried out during June 2018.

Study Population, Sampling method and size**Sampling method**

An electronic questionnaire was collected from medical students from all years and specialties.

Inclusion criteria:

All medical students at Taibah University were included.

Exclusion criteria

Non -medical students.

Sample size

The sample size was 432 dependent on recent researches carried out on the same topic.

Data Collection Method and Measurements

Data will be collected using an **electronic questionnaire** designed in English language, that includes the following sections:

1. **Section I: Socio-demographic data**
(age, sex, specialty, weight, etc.)
2. **Section II: memory scale**
3. **Section III: question about factors that impair memory (diseases, drugs, lifestyle, etc.)**

Data Management and analysis plan

For the data entry and statistical analysis, statistical package for the social sciences (SPSS) version 22.0 will be used.

RESULTS:

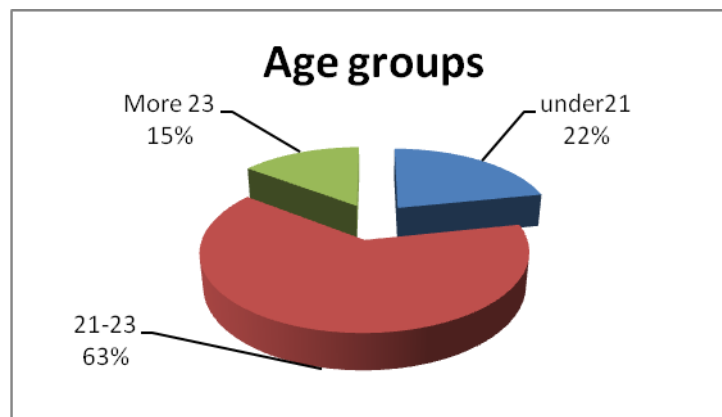
The study participant's Demographic analysis:

1. Distribution of the participants by Age groups:

Table (1) Distribution of the participants by Age groups

Variable		Frequency	Percent
Age	under21	92	21.7
	21-23	269	63.6
	More 23	62	14.7
	Total	423	100.0

Graph (1) Age groups



The data show the different age groups(21-23 years) has the highest representation (63%) ,& age group under 21years old was (21%).And age group (more 23 years) represented about (14%) of the total sample.

Distribution of the participants by Gender groups:

Table (2) Distribution of the participants by Gender groups

Variable		Frequency	Percent
Gender	Male	95	22.5
	Female	328	77.5
	Total	423	100.0

Graph (2)Gender groups:

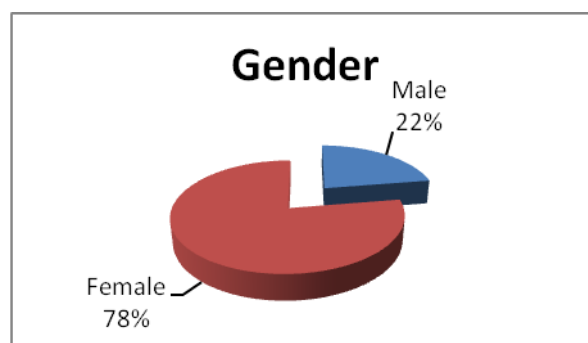


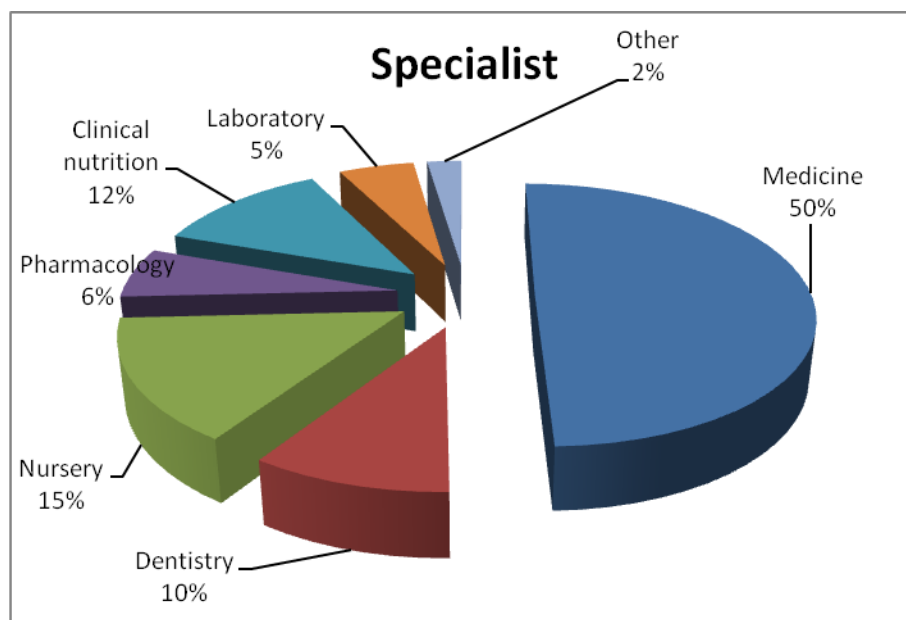
Table (2) shows gender groups (Male) has the lowest representation (22.5%) ,& gender group female (77.5%).

Distribution of the participants by Specialist groups:

Table (3) Distribution of the participants by Specialist groups

Variable		Frequency	Percent
Specialist	Medicine	210	49.6
	Dentistry	41	9.7
	Nursery	63	14.9
	Pharmacology	26	6.1
	Clinical nutrition	51	12.1
	Laboratory	22	5.2
	Other	10	2.4
	Total	423	100.0

Graph (3) Specialist groups



The results show that specialist group (medicine) has the highest representation (49%) ,& Other specialist was between (2.4% - 14.9%) .

Table (4) descriptive statistic for Smoking variable

Are you a smoker	N	Mean	Std. Deviation	Std. Error Mean
Yes	29(6.8%)	60.28	18.570	3.448
No	394(93.1%)	65.70	15.702	.791

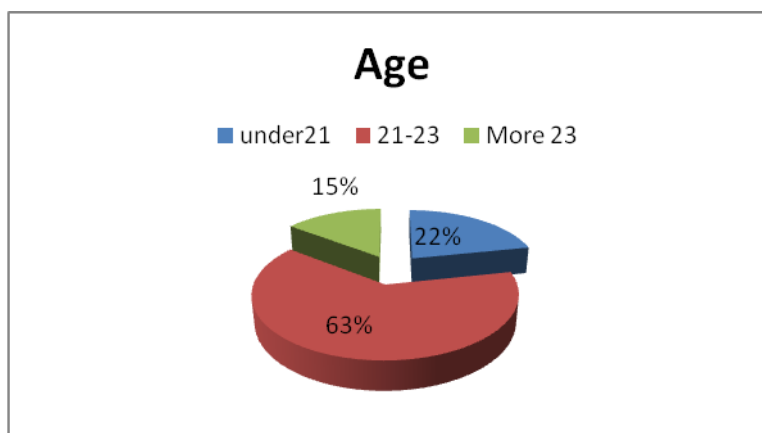
Table (5) t test for smoking variable

Levene's Test for Equality of Variances		t-test for Equality of Means		
F	Sig.	t	df	Sig. (2-tailed)
0.731	0.393	1.773	421	0.077

The table shows the t test of smoking variable is 1.77 which considered not significant.

Table (6) descriptive statistic for age variable

Age	N	Mean	Std. Deviation
under21	92	64.35	16.108
21-23	269	65.34	16.192
More 23	62	66.76	14.739
Total	423	65.33	15.949

Graph (4)age variable**Table (7) ANOVA test for Age variable**

Source of variance	Sum of Squares	Df	Mean Square	F	Sig.
Age	215.208	2	107.604	0.42	0.66
Within Groups	107126.456	420	255.063		
Total	107341.664	422			

The table above shows age variable $F = 0.42$ which considered not significant.

Table (8) descriptive statistic for Specialist variable

Specialist	N	Mean	Std. Deviation
Medicine	210	67.31	15.692
Dentistry	41	64.32	16.108
Nursing	63	59.29	17.414
Pharmacology	26	63.27	16.163
Clinical nutrition	51	68.55	12.635
Laboratory	22	60.86	16.921
Other	10	64.80	14.620
Total	423	65.33	15.949

Graph (5) Specialist groups

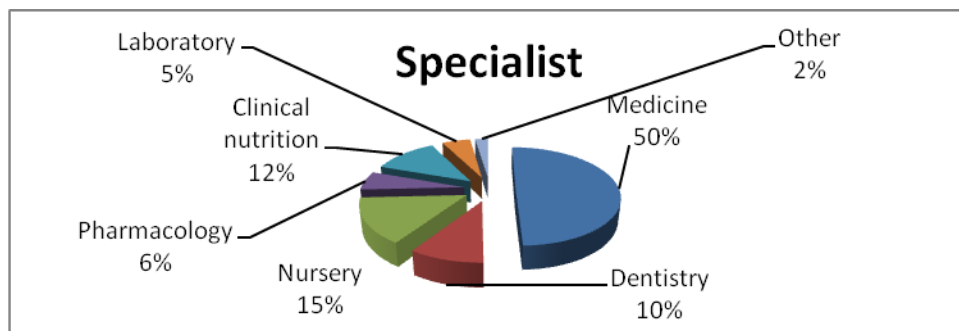


Table (9) ANOVA test for Specialist variable

Source of variance	Sum of Squares	df	Mean Square	F	Sig.
Specialist	4247.114	6	707.852	2.856	0.01
Within Groups	103094.550	416	247.823		
Total	107341.664	422			

The table above shows specialist variable $F = 2.856$ which is considered significant. To know for which specialist Scheffe test was used and table (10) shows that.

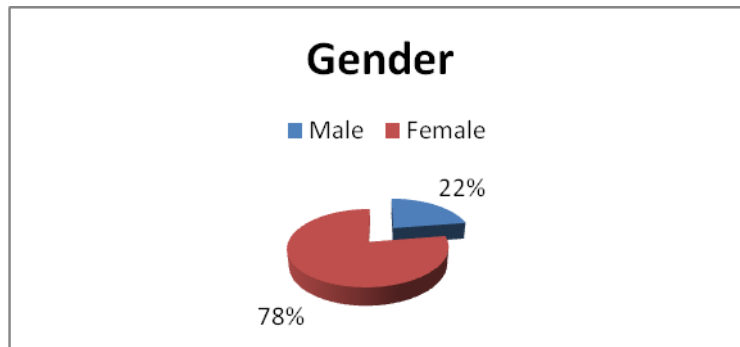
Table (10) Scheffe test comparisons between specialist variable

(I) Specialist	(J) Specialist	Mean Difference (I-J)	Std. Error	Sig.
Medicine	Dentistry	2.992	2.688	0.975
	Nursing	8.024*	2.261	0.05
	Pharmacology	4.040	3.273	0.958
	Clinical nutrition	-1.239	2.458	1.000
	Laboratory	6.446	3.528	0.765
	Other	2.510	5.095	1.000
Dentistry	Nursing	5.031	3.159	0.864
	Pharmacology	1.048	3.947	1.000
	Clinical nutrition	-4.232	3.302	0.949
	Laboratory	3.453	4.160	0.995
	Other	-.483	5.552	1.000
Nursing	Pharmacology	-3.984	3.670	0.978
	Clinical nutrition	-9.263	2.965	0.138
	Laboratory	-1.578	3.899	1.000
	Other	-5.514	5.359	0.983
Pharmacology	Clinical nutrition	-5.280	3.794	0.925
	Laboratory	2.406	4.560	1.000
	Other	-1.531	5.858	1.000
Clinical nutrition	Laboratory	7.685	4.015	0.722
	Other	3.749	5.444	0.998
Laboratory	Other	-3.936	6.004	0.999

From table above it shows there are no sig for most specialists, except between Medicine & Nursing and it was for Medicine.

Table (11) descriptive statistic for gender variable

gender	N	Mean	Std. Deviation
Male	95	67.63	17.560
Female	328	64.66	15.416

Graph (6) gender groups**Table (12) t test for gender variable**

Levene's Test for Equality of Variances		t-test for Equality of Means		
F	Sig.	t	df	Sig. (2-tailed)
0.592	0.442	1.600	421	0.110

The table shows gender variable $t = 1.60$ which considered not significant.

Table (13) descriptive statistic for Exercise variable

Exercise	N	Mean	Std. Deviation
More than 3 times	66	67.58	17.444
Less than 3 times	147	63.56	15.593
None	210	65.87	15.653
Total	423	65.33	15.949

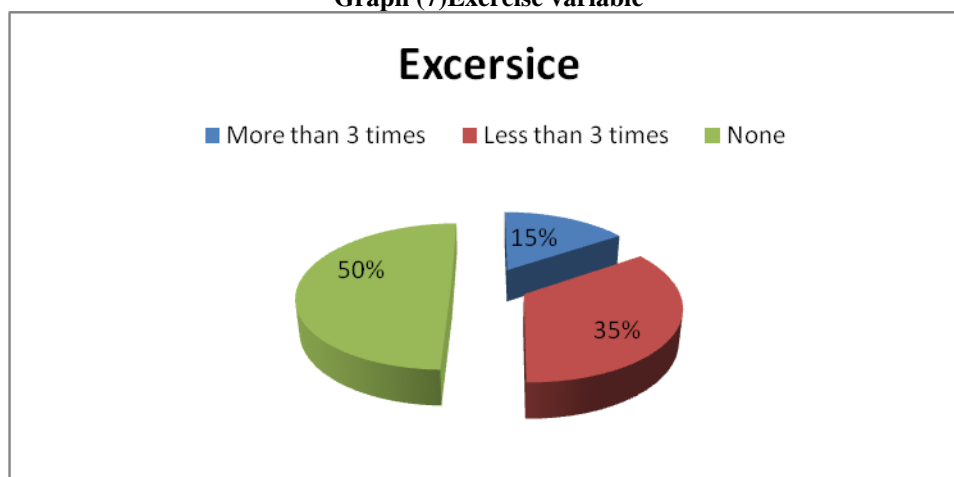
Graph (7) Exercise variable

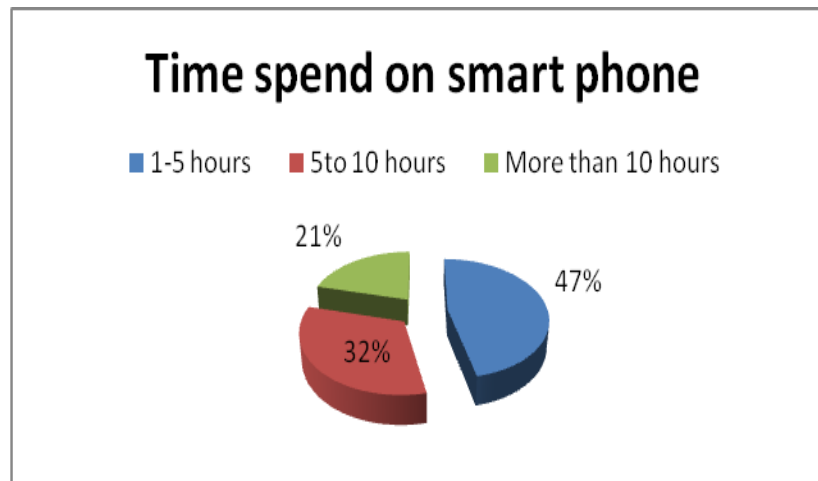
Table (14) ANOVA test for exercise variable

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	855.018	2	427.509	1.686	0.186
Within Groups	106486.646	420	253.540		
Total	107341.664	422			

The table above showsexercise variable $F = 1.686$ which considered not significant.

Table (15) descriptive statistic for Time spend on smart phones variable

Time spend on smart phones	N	Mean	Std. Deviation
1-5 hours	197	65.55	16.387
5-10	137	66.53	14.594
More than 10	89	63.00	16.873
Total	423	65.33	15.949

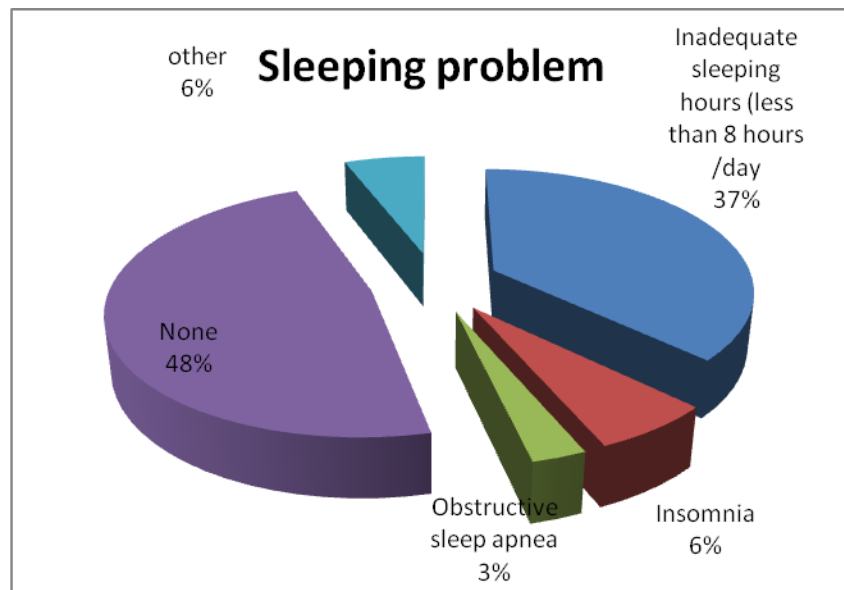
Graph (8)Time spend on smart phones**Table (16) ANOVA test for Time spend on smart phones variable**

Time spend on smart phones	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	690.770	2	345.385	1.360	0.258
Within Groups	106650.894	420	253.931		
Total	107341.664	422			

The table shows smart phones variable $F = 1.360$ which considered not significant.

Table (17) descriptive statistic for Time spend on sleep problem variable

sleep problem	N	Mean	Std. Deviation
Inadequate sleeping hours (less than 8 hours /day	157	62.50	16.465
Insomnia	27	62.85	17.963
Obstructive sleep apnea	12	60.50	22.387
None	202	68.33	14.666
Other	25	63.88	13.461
Total	423	65.33	15.949

Graph (9) Sleeping problem**Table (18) ANOVA test for sleep problem variable**

sleep problem	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	3566.933	4	891.733	3.592	0.007
Within Groups	103774.731	418	248.265		
Total	107341.664	422			

From the table above it shows sig for sleep problem variable $F= 3.592$ its sig at $\alpha \leq 0.05$. That mean sleep problem is a common factor that affects memory among students.

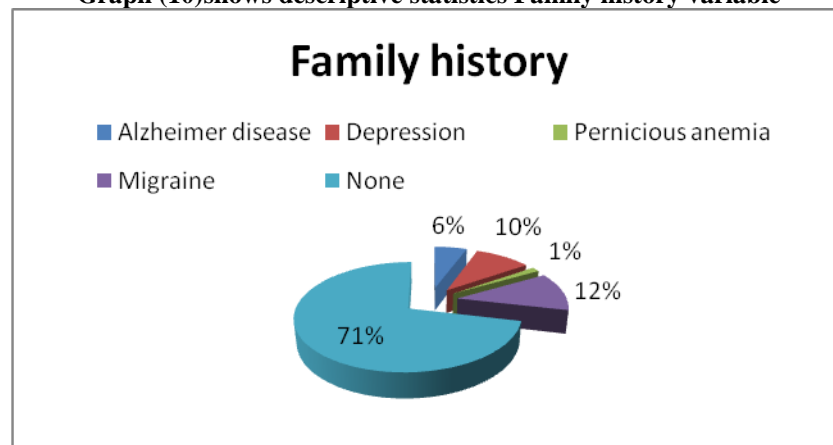
Table (19) Scheffe test comparisons between sleep problem variable

Scheffe				
(I)	(J)	Mean Difference (I-J)	Std. Error	Sig.
Inadequate sleeping hours (less than 8 hours /day	Insomnia	-.349	3.283	1.000
	Obstructive sleep apnea	2.003	4.719	0.996
	None	-5.824*	1.676	0.018
	Other	-1.377	3.393	0.997
Insomnia	Obstructive sleep apnea	2.352	5.467	0.996
	None	-5.475	3.229	0.579
	Other	-1.028	4.373	1.000
Obstructive sleep apnea	None	-7.827	4.682	0.593
	Other	-3.380	5.533	0.985
None	Other	4.447	3.341	0.778

From the table above it shows no sig for comparison between sleep problem variable.

Table (20) descriptive statistic for Family history variable

Family history	N	Mean	Std. Deviation
Alzheimer disease	24	58.96	20.626
Depression	41	64.20	15.434
Pernicious anemia	6	66.67	8.501
Migraine	50	64.66	14.201
None	302	66.08	15.948
Total	423	65.33	15.949

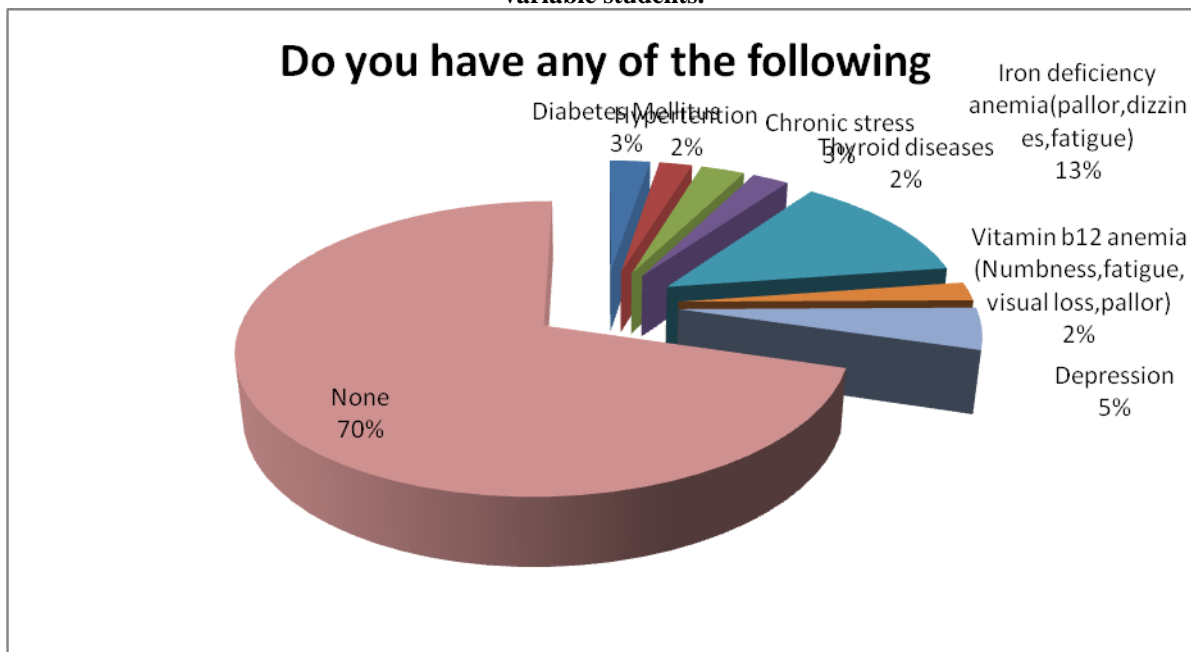
Graph (10) shows descriptive statistics Family history variable**Table (21) ANOVA test for Family history of chronic diseases variable**

Family history	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1228.465	4	307.116	1.210	0.306
Within Groups	106113.199	418	253.859		
Total	107341.664	422			

The table shows Family history of chronic diseases variable $F = 1.360$ which considered not significant.

Table (22) descriptive statistic for Chronic illness

Do you have any of the following	N	Mean	Std. Deviation
Diabetes Mellitus	11	65.00	14.866
Hypertension	9	54.56	22.716
Chronic stress	12	65.00	14.685
Thyroid diseases	10	54.60	14.894
Iron deficiency anemia(pallor,dizziness,fatigue)	54	68.17	15.315
Vitamin b12 anemia (Numbness,fatigue,visual loss,pallor)	9	62.44	13.001
Depression	20	63.05	17.581
None	298	65.77	15.796
Total	423	65.33	15.949

Graph (11) shows descriptive statistics for Chronic illness variable students.**Table (23) ANOVA test for Chronic illness**

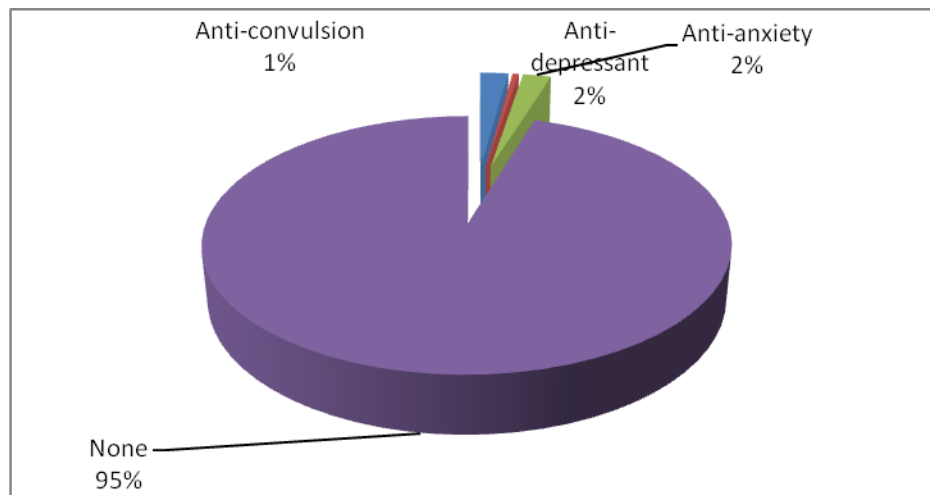
Chronic illness	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	2869.346	7	409.907	1.628	0.126
Within Groups	104472.318	415	251.741		
Total	107341.664	422			

The table above shows Chronic illness variable $F = 1.628$ which is considered not significant.

Table (24) descriptive statistic for medication history

Do you take any of the following medication	N	Mean	Std. Deviation	Std. Error
Anti-depressant	9	61.33	22.051	7.350
Anti-convulsion	2	59.00	5.657	4.000
Anti-anxiety	9	48.44	17.671	5.890
None	403	65.83	15.616	.778
Total	423	65.33	15.949	.775

Graph (12) shows descriptive statistics Do you take any of the following medication variable students.

**Table (25) :Kruskal Wallis test medication history**

Ranks					
Medication	N	Mean Rank	Chi-Square	df	Asymp. Sig.
Anti-depressant	9	200.06	9.106	3	0.03
Anti-convulsion	2	136.00			
Anti-anxiety	9	97.00			
None	403	215.21			
Total	423				

The table shows medication history variable chi= 9.6106 which considered significant.

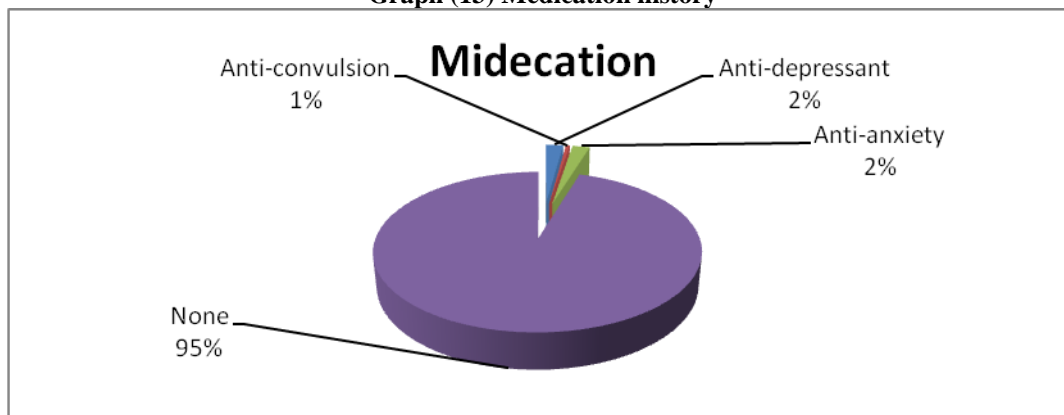
Graph (13) Medication history

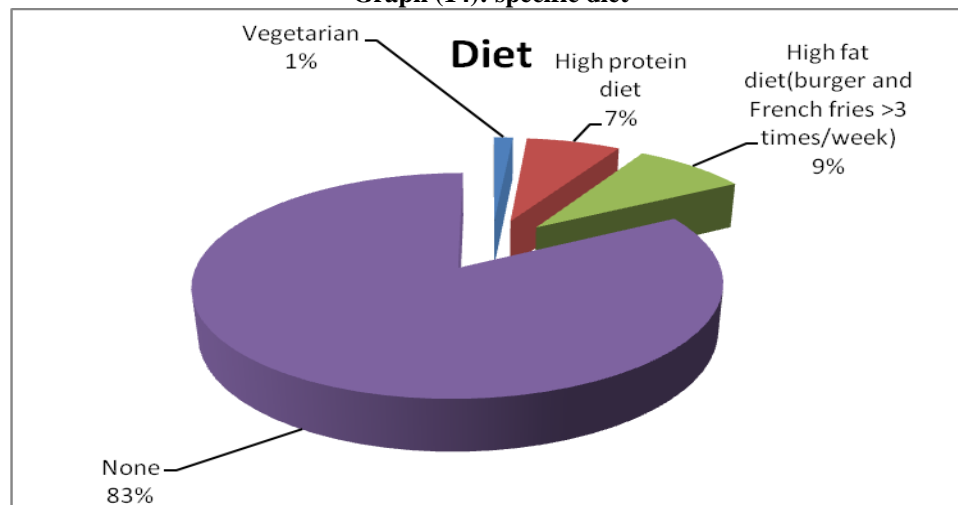
Table (26) Scheffe test comparisons between medication variable

Multiple Comparisons				
Scheffe				
(I)	(J)	Mean Difference (I-J)	Std. Error	Sig.
Anti-depressant	Anti-convulsion	2.33	12.343	0.998
	Anti-anxiety	12.89	7.443	0.393
	None	-4.50	5.321	0.870
Anti-convulsion	Anti-anxiety	10.56	12.343	0.866
	None	-6.83	11.192	0.946
Anti-anxiety	None	-17.38*	5.321	0.014

From the table above it shows no sig for comparison between medications variable. Except between (Anti-anxiety) & none and it was for none.

Table (27) descriptive statistic for specific diet

specific diet	N	Mean	Std. Deviation
Vegetarian	6	62.83	24.145
High protein diet	30	67.53	17.851
High fat diet(burger and French fries >3 times/week)	36	59.25	17.382
None	351	65.81	15.401
Total	423	65.33	15.949

Graph (14): specific diet**Table (28) ANOVA test for specific diet variable**

specific diet	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1594.403	3	531.468	2.106	.099
Within Groups	105747.261	419	252.380		
Total	107341.664	422			

The table shows specific diet variable F= 2.106 which considered not significant.

Table (29) shows means and SD for Memory score

Situations	N	Minimum	Maximum	Mean	Std. Deviation
Forgetting where you have put something. Losing things around the house	423	1	5	2.72	0.98
Failing to recognize places that you have been before	423	1	5	3.59	1.15
Finding a television story difficult to follow	423	1	5	3.74	1.17
Not remembering a change in your daily routine, such as a change in the place where something is kept, or a change in the time something happens. following your old routine by mistake.	423	1	5	3.37	1.21
Having to go back to check whether you have done something that you meant to do.	423	1	5	2.60	1.17
Completely forgetting to take things with you, or leaving things behind and having to go back and fetch them.	423	1	5	2.88	1.05
Forgetting that you were told something yesterday or a few days ago and having to be reminded about it.	423	1	5	2.86	1.17
Starting to read something (book ,newspaper, magazine) without realizing you have already read it .	423	1	5	3.61	1.26
Having difficulty picking up a new skill. For example, finding it hard to learn a new game or to work a new gadget after you have practiced it once or twice .	423	1	5	3.60	1.25
Finding that a word is " on the tip of your tongue" You know what it is but you can't quite find it.	423	1	5	2.79	1.10
Forgetting details of what you did or what happened to you the day before.	423	1	5	3.20	1.17
When talking to someone ,forgetting what you have just said. Maybe saying "what was i talking about?	423	1	5	3.04	1.18
When reading a newspaper or magazine ,being unable to follow the thread of a story ,losing track of what it is about.	423	1	5	3.28	1.25
Getting the details of what someone has told you mixed up and confused.	423	1	5	3.11	1.10

Telling someone a story or joke that you have told them already.	423	1	5	3.16	1.20
Forgetting details of things you do regularly ,whether at home or at work, for example, forgetting details of what to do or what time it is.	423	1	5	3.52	1.17
Forgetting where things are normally kept or looking for them in the wrong place.	423	1	5	3.40	1.21
Getting lost or turning in the wrong direction on a journey, on a walk or in a building where you have been before .	423	1	5	3.47	1.19
Repeating to someone what you have just told them or asking them the same question twice.	423	1	5	3.36	1.19
Doing some routine things twice by mistake. For example, putting two bags of tea in the teapot ,or brushing your hair when you have just done so.	423	1	5	4.02	1.15

Table (30) Is there a correlation between low memory score and Risk factors

Variable		
Smoking	Pearson Correlation	.102
	Sig. (2-tailed)	.213
	N	151
Exercise	Pearson Correlation	.035
	Sig. (2-tailed)	.669
	N	151
for Time spend on smart phones	Pearson Correlation	-.085
	Sig. (2-tailed)	.298
	N	151
sleep problem	Pearson Correlation	.098
	Sig. (2-tailed)	.230
	N	151
Family history	Pearson Correlation	.031
	Sig. (2-tailed)	.709
	N	151
Chronic illness	Pearson Correlation	.058
	Sig. (2-tailed)	.482
	N	151
Medication history	Pearson Correlation	.110
	Sig. (2-tailed)	.177
	N	151
specific diet	Pearson Correlation	.217**
	Sig. (2-tailed)	.008

The table shows a positive correlation between specific diet and high score.

And it shows no correlation between other factors on memory

Table (31) Is there correlation between high score of memory and Risk factors

Variable		
Smoking	Pearson Correlation	.055
	Sig. (2-tailed)	.365
	N	272
Exercise	Pearson Correlation	-.082
	Sig. (2-tailed)	.178
	N	272
for Time spend on smart phones	Pearson Correlation	-.134*
	Sig. (2-tailed)	.027
	N	272
sleep problem	Pearson Correlation	.056
	Sig. (2-tailed)	.357
	N	272
Family history	Pearson Correlation	.023
	Sig. (2-tailed)	.710
	N	272
Chronic illness	Pearson Correlation	-.015
	Sig. (2-tailed)	.802
	N	272
Medication history	Pearson Correlation	.009
	Sig. (2-tailed)	.883
	N	272
specific diet	Pearson Correlation	.016
	Sig. (2-tailed)	.789
	N	272

From table (31) shows a negative correlation between Time spend on smart phones & high score of memory, and it show no correlation between other factors on memory.

DISCUSSION:

In this study, we aimed at evaluating the factors that could impair the memory of medical students in Taibah University.

We found that there was positive correlation between sleep problem and memory impairment among students. Similar research has studied the relation between performance and sleep loss showed the same result [7] which means that is improving sleep habits will improve the memory.

The study also showed that students who spend less time on smart phones (less than 5 hours per day) has higher score on memory scale compared to other students who spend much more time (more than 5 hours per day) on smart phones. Previous research studies indicated that there was an association between decreased attention and heavy smart phone usage [10]. Although there is an obvious deficient in the data and study that clearly explain the mechanism of how smart phone affecting memory, the recommendation is to reduce the time spent on smart

phone, video games as much as you can.

It was found that exercise is not a common factor that affects memory among students. Comparing to other researches exercise can positively impact cognitive function and may improve memory. This discrepancy could be explained by lack of regular exercise with studied groups. Indeed, lack of gyms and suitable places to do activities especially for women and hot weather could play a role in lazy lifestyle [11].

We found that smoking doesn't play any role in affecting the memory mainly this could be explained by high number of females (328) compared to males (95). Although it is unclear exactly how smoking may interfere with memory, research has shown that chronic smoking is linked to a breakdown, or atrophy of parts of the brain [12].

Previous research studied the effect of smoking on prospective memory yielded mixed results, some results showing smokers were worse off, and others

showing no effect from smoking [12].

In this study we found that there was no correlation between medical illnesses and memory loss among medical students.

In other studies, it found that general medical diseases may also lead to an impairment of memory, e.g., diabetes mellitus and obstructive sleep apnea (OSA) [13].

In another study, it was revealed that, In multivariable regression models that included age, sex, education, hypertension, BMI, HbA1c, and depressive symptoms, anemia were associated with slower processing speed and working memory (Digit Span Task) but not executive functioning, verbal learning, or memory [14].

We believe that these differences between studies are due to lack of standard evaluation of each disease on memory loss.

In general, patients with chronic illnesses may not show any problem in memory if they are controlled and do not have any complications.

Our results indicated that medication is not a factor affecting the memory among medical students. Comparing to other study results, some medication like benzodiazepine, Selective serotonin reuptake inhibitors antidepressants and newer anticonvulsants showed a strong association with memory disorder [15]. We think using these medications for a long term and also the age is considered important associated factors in drug-induced memory loss comparing to average age of our study group which was with younger ages and that's need a long-term study.

Results from this study indicate that there is no significant association between specific diet and memory in the studied groups. Majority of students (83%) claimed that they are not following a specific regimen; however, they are not receiving healthy diet. Caffeine containing drinks, carbohydrates rich or sugary products could probably be largely consumed by these students, which of all were related to mood, memory and general performance affection to certain extents. Across-sectional study carried by Fracis et al [16]. concluded that high fat and sugar diets can cause poorer performance on hippocampal sensitive memory tasks. Moreover, habitual caffeine consumption via coffee and tea was strongly related to better long-term memory over different age group, a study agreed by Hameleers et al. This suggests that students who consume coffee in regular basis are

more likely to show higher performance on memory tasks on the long-term over those who do not [17].

CONCLUSION & RECOMMENDATION:

In this study we aimed at studying the effect of different factors on memory in medical student at Taibah University in Al-Madinah. We found that smart phone using, sleeping habits and diet impact the memory significantly. According to this study, the recommendation to increase the awareness in the population by doing more campaigns in malls and hospitals to educate the people about the factors that could improve or impair their memory which affect the quality of their life.

Since there's a marked deficiency in researches covering this field, more evidence-based researches are needed in this area to clear the mechanism of how these factors affecting the memory.

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