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Original Articles

The Effect of Short-Term Fasting on Ocular Biometry

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Abstract:

Introduction: Islamic religious fasting is an action that inhibits its believers from consuming any food or drink and sometimes fasting can also be observed on Mondays or Thursdays. Ocular biometry parameters which include axial length, anterior chamber angle and depth play significant role in determining the refractive power of the eye as well as in certain ocular conditions. **Objective:** The purpose of the study was to identify the effect of short-term fasting to the ocular biometry. **Method***:* This prospective study included 37 healthy participants with a mean age of 22.51 ± 0.77 years old. The measurements were done on a day with non-fasting state (at 8.00 a.m. and 4.00 p.m.) and one week later during the fasting period (at 8.00 a.m. and 4.00 a.m.). Anterior chamber and angle were measured using Pentacam HR (Oculus, Germany) while axial length was measured using A-scan (Tomey AL-3000). **Result:** The results indicated no significant changes between short-term fasting and non-fasting state with all the variables ($p > 0.05$). Similarly, no significant changes were noted during diurnal fluctuations with all the parameters ($p > 0.05$). **Conclusion:** There is no issue of reliability of the ocular biometric data when patients undergo short-term fasting state.

Keywords: ocular biometry, axial length, anterior chamber depth, anterior chamber angle, Islamic religious fasting

Introduction:

Islamic religious fasting is an action which inhibits people from consuming any food or drink. Period of fasting varied based on country or geographical locations on earth. The onset of fasting is from dawn to sunset. Fasting is not only observed in the month of Ramadhan, but it can also be observed weekly on Mondays and Thursdays. The type of food intake during fasting is similar with non-fasting day (Nowroozzadeh et al., 2012). In the morning before the sunrise, people usually take a considerable amount of food to maintain their appetite during the day and break their fast at sunset with some amount of food (Nowroozzadeh et al., 2012). This will alter the physiological system in the body (Iqbal et al., 2019). Fasting in the month of Ramadhan causes many physiological, biochemical, and metabolic changes in the body, for example the blood count and cholesterol level may change significantly. The cholesterol level and blood count show positive impact on people who are fasting (Baser, Cengiz et al., 2014). In addition, people who are fasting can reduce their body mass index (BMI) to the preferable number (Nickla, Wildsoet & Wallman, 1998).

Ocular biometry is the test that measures the shape and size of the eyeusing an ultrasound wave

that penetrates into the eye and translates it into an image or data. The measurement of axial length is defined as the length from the anterior cornea to the inner limiting membrane of the eye while the anterior chamber is the distance between the posterior surface of the cornea to the front surface of the crystalline lens (Kayikçioğlu & Güler, 2000). The eye can be divided into two segments, the anterior and posterior parts. The anterior part is from the cornea up to the crystalline lens that includes anterior chamber, posterior chamber and iris while the posterior part comprises of vitreous humour, retina, choroid, fundus and optic disc (Kayikçioğlu et al., 2000).

Fasting can induce certain changes in the ocular shape. Past study showed that by fasting in Ramadhan, there were some parameters for example axial length and anterior chamber depth that changed significantly and the change induced disapproving alterations of other ocular measurements (Heravian et al., 2015). People who fasts have shown to have an increase intraocular lense (IOL) power measurement compared to when they are measured in a non-fasting state (Nowroozzadeh et al., 2012).

Materials and Methods:

The participants of the study were recruited among the International Islamic University Malaysia (IIUM) Kuantan students. The data was collected from 37 subjects, aged 20 to 25 years. The subjects were recruited among IIUM students regardless of their gender and the method of sampling used was via convenient sampling.

Subjects were given an explanation about the study and all the procedures that would take place. Informed consent was obtained from each subject before they were included in the study. Nevertheless, only the participants who fulfilled the criteria were enrolled in this study. The inclusion criteria of the study were:

i. University students of IIUM Kuantan to ensure compliance.

ii. Both male and female students with age between 19 and 25 years. Read, Collins and Iskander (2008) suggest that age have an effect on ocular biometry measurement.

The exclusion criteria were:

i. History of ocular trauma, surgery or significant underlying of ocular pathology. Chakraborty et al. (2011) suggest that the axial length have relationship with posterior part of the eye.

ii. Systemic disease. Nowroozadeh et al. (2011) suggest that patient with any systemic disease should be excluded.

iii. Pregnant woman and lactating mother.

iv. Smokers.

v. Full time contact lens wearer.

vi. Subject without clear cornea. Tan et al. (2011) stated that subject must not have ocular media abnormalities.

Anterior chamber angle and depth were measured using Pentacam HR (Oculus, Germany) as shown in Figure 1. Subjects were asked to sit and were instructed to place their chin on the chinrest and rest their forehead against the forehead strap. The patients were asked to fixate straight ahead on the fixation target (blue circular ring). The room lights were switched off and to obtain a reflex-free image, the cover cloth was placed over the subjects head and the Pentacam. Subjects were asked to look straight, fixate on the light emitted from the center, and refrain from blinking during the scanning process. The image was taken automatically. For Pentacam, only measurements with 'OK' status were included in this study.

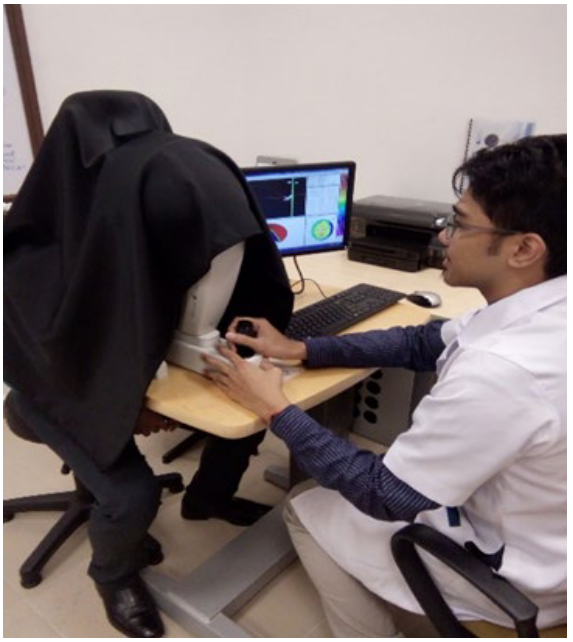

Figure 1: Anterior chamber angle and depth measurement

Axial length measurement was measured after the subject went through Pentacam examination as depicted in Figure 2.

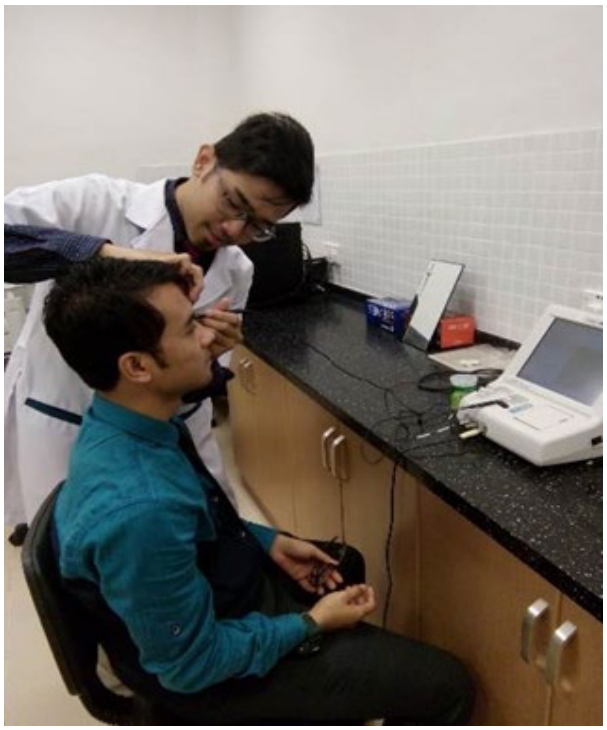

Figure 2: Axial length measurement

Subjects were asked to sit and were explained about the purpose of the test and the aim of the study again. The probe was cleaned off with alcohol swab first and rinsed with saline solution to keep it sterile. Subjects were instilled with anaesthetic (Alcaine 0.5%, Propacaine Hydrocloride). Then, they were asked to look forward straight and fixate a target. The probe was placed perpendicularly and touched gently at the center of the cornea. Five best readings were recorded and an average of them was taken as the final value.

Statistical Analysis

All data were analysed using SPSS computer program for Windows (version 12.1.1). The normality of the data was determined using the Kolmogorov and Smirnov method. All data that passed the normality test were subjected to paired sample t-test while those data that did not pass the normality test were analysed using Wilcoxon signed-rank test. Measurements of the non-fasting days were compared with those at the same hour (8.00 am and 4.00 pm) during the fasting days. The measurements at 8.00 am and 4.00 pm during the fasting day were also compared to observe the effect of fasting as it progressed. A p-value of 0.05 or less was considered statistically significant.

Results:

The mean age of the participants (n = 37) was 22.51 ± 0.77 years (21–24 years). Eighteen males and 19 females had participated in this study.

Comparison between fasting and non-fasting

In Table 1, comparison of measurements between fasting and non-fasting periods at 8.00 am revealed no significant values for mean different in axial length (p=0.590), anterior chamber angle (p=0.674) and anterior chamber depth (p=0.351). Similarly, at 4.00 pm, the measurements were found to be not statistically significant for mean different of axial length (p=0.757), anterior chamber angle (p=0.518) and anterior chamber depth (p=0.757) respectively.

Comparison between morning and evening

As shown in Table 2, during fasting period, the diurnal variation was observed but there was no statistical difference between morning and evening in the fasting states for axial length (p=0.549), anterior chamber angle (p=0.126) and anterior chamber depth (p=0.100). In the non-fasting measurements, the diurnal variation was not statistically significant in the measurements of axial length (p=0.681), anterior chamber angle (p= 0.674), anterior chamber depth (p=0.351).

Table 1: Comparison of axial length, anterior chamber angle and anterior chamber depth between fasting and non-fasting

	Ocular biometry	Mean diff ± SD or Median (CI)	*p* (significant value)
8.00 AM	Axial length (mm)	0.0315 ± 0.337	0.590
	Anterior chamber angle (mm)	0.000 (-0.138, 0.071)	0.674
	Anterior chamber depth (mm)	-0.500 (-3.059, 1.024)	0.351
4.00 PM	Axial length (mm)	0.023 ± 0.338	0.757
	Anterior chamber angle (mm)	-0.010 ± 0.317	0.518
	Anterior chamber depth (mm)	-0.294 ± 5.496	0.757

Table 2: Comparison of axial length, anterior chamber angle and anterior chamber depth between morning and evening.

	Ocular biometry	Median (CI)	*p* (significant value)
Fasting	Axial length (mm)	0.005 (-0.098, 0.024)	0.549
	Anterior chamber angle (mm)	0.000 (-0.009, 0.059)	0.126
	Anterior chamber depth (mm)	0.750 (-0.164,2.182)	0.100
Non-fasting	Axial length (mm)	0.005 (-0.177,0.119)	0.681
	Anterior chamber angle (mm)	-0.020 (-0.045,0.053)	0.674
	Anterior chamber depth (mm)	0.900 (-1.360,1.931)	0.351

Discussion:

Ocular biometric measurements remain the most important factors responsible for post-operative refractive error. The ocular biometric could be from the cornea, anterior chamber depth, lens thickness, central corneal thickness, and axial length (Yeu, 2019). In our present study, the effect of fasting was compared to see whether it can affect the ocular biometry and in turn will affect the refractive status (Zhang et al., 2018). We focused on these factors to uncover the causes for possible intraocular lens or refractive power measurement change during short-term fasting. In the study done by Norrby (2008), the error calculation of anterior chamber depth in cataract surgery may lead to the error in prediction of the intraocular power thus affecting the refractive error calculation.

Comparison of axial length and anterior chamber depth between fasting and non-fasting states

We found that axial length has no significant effect following short term fasting. From our examination, the result between fasting and non-fasting states showed the mean axial length had no significant change. This may be due to the minimal effect of dehydration. Next, the result from the diurnal effect in the two states of the day also showed no significant result. This parameter is known to be resilient against changes even intervention was introduced (Lau et al., 2019). The variations of axial length between two non-fasting days showed significant result when they were compared between weeks or month (Chakraborty et al., 2011).

In the study done by Baser et al. (2014), the effect of anterior chamber angle gave significant result between fasting month and non-fasting month. Contradiction to that, our results show insignificant change in the morning and evening. Moreover, the result showed that the mean between morning and evening for fasting and non-fasting day is not significant which the effect of dehydration may not happen diurnally. The possible reason may be because the participants did not drink at pre-dawn, thus the effect of water loading that happens in fasting month does not happen in short-term fasting. During religious fasting month, people usually drink a lot of water before dawn to avoid the effect of dehydration, thus resulting in the anterior chamber calculation of fasting month to be deeper in the morning (Albagi and Alameen, 2014). During short-term religious fasting, people tend to not drink water as in fasting month because the effect of dehydration may not be as severe as in the fasting month. Thus the effect of water loading is fully established in long-term fasting because of the drinking effect during the pre-dawn breakfast.

Theoretically, the effect of fasting can be achieved in a month of Ramadhan, Nowroozzadeh (2012) also states that dehydration happens during fasting period can shrink the vitreous humor and decrease the axial length. Usually during Islamic religious fasting month, people tend to drink 50% more water than normal months, causing the effect of higher water loading (Kerimoglu et al., 2009). A study done by Albagi and Alameen (2014) agrees with our study that the axial length does not show any significant result between fasting and non-fasting state.

Anterior chamber angle between fasting and non-fasting state.

The anterior chamber angle is an angle that is measured between the root of the iris and the peripheral corneal vault. It is one of very important parameter in determining the eye-threatening disease which is glaucoma. Glaucoma that commonly relates with ocular biometry is primary angle closure glaucoma (ACG). It is a condition that results to irregular structure of anterior chamber angle (Hayashi et al., 2000). Studies have proven that anterior chamber angle and changes of anterior chamber depth contributed to the ACG. Among all the parameters involved, anterior chamber angle showed the most important factor in determining ACG (Wilensky et al., 1993). A study done by Aung (2005) states that eyes

with primary angle closure have are likely to have shallow anterior chamber depth (ACD), thick lens, shifted anterior lens position, small corneal diameter and radius of curvature, and short axial length.

Thus, it is significant that this parameter to be measured in our study. In the previous research works, none of them studied about the effect of anterior chamber angle. Besides, the risk of having angle closure in narrow anterior chamber depth is very high and also they also have the tendency to have glaucomatous optic neuropathy (Aung, 2015). The reason why the anterior chamber angle was not significantly reduced between fasting state and non-fasting state may be because the anterior chamber depth did not change. As stated in the study before (Kerimoglu et al., 2009), the theory of accumulation of ocular dehydration is the main factor of ocular biometric to change, it is also applied in the anterior chamber angle. Whenever the anterior chamber angle becomes narrow, the risk of having angle closure may increase (Congdon et al., 1992).

Conclusion:

In this study we found that there was no significant change in the biometric parameters after observing the Islamic religious daily fasting. The data suggest that there is no significant different in axial length, anterior chamber depth and angle between non-fasting and daily fasting states. Thus, there is no issue in the reliability of the ocular biometric data and the measurements can be conducted while the patient is in the short-term fasting state.

Declaration of interest:

The authors have no proprietary interest in any materials or methods described within this paper. This submission has not been published anywhere previously and it is not simultaneously being considered for any other publication.

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Knowledge, Awareness, and Breast Self-Examination Practice Among Nurses in Sultan Ahmad Shah Medical Centre: A Follow-Up 6 Months Study

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Abstract:

Background: Nurses play an important role as public health educators, particularly in breast cancer screening. Therefore, follow-up studies on breast cancer and breast self-examination (BSE) are important to ensure that nurses' knowledge is updated. The objectives are to determine the knowledge, awareness, and practice (KAP) of breast cancer and BSE among staff nurses in SASMEC@IIUM in Kuantan, Pahang, and its association with socio-demographic factors. **Methodology:** A quasi-experimental study was conducted among 50 nurses. A validated questionnaire was utilised to assess the KAP of BSE domains. Data was analysed for descriptive statistics and Wilcoxon signed-rank test to compare the changes. **Results:** A total of 50 nurses were involved in the pretest. However, only 30 nurses were retained at the 6-month posttest. Most were females (86.7%), Malay (96.7%), married (66.7%), with a family history of cancer (26.7%), and have a family history of breast cancer (13.3%). Positive improvements were observed in their median scores for knowledge and practice related to BSE domains post-6-month. A significant association was noted between knowledge of the risk factors among the nurses posttest (p = 0.015). **Conclusion:** The webinar on breast cancer improved the nurses' knowledge of breast cancer risk factors. Continuous effort is vital to sustain the positive changes in BSE practice and improve the nurses' awareness of delivering health education on breast cancer. An intervention that integrates digital technology is perhaps needed in the future to achieve a better outcome.

Keywords: Breast self-examination, knowledge, awareness, practice, nurses

Introduction:

Globally, the United States of America (USA) reported 1.2 million females having breast cancer in 2018, while Australia, Germany, and New Zealand reported an incidence of 20,000, 70,000, and 3,266 between 2012 to 2017 (Centre for Disease Control and Prevention, 2021; Espina et al., 2017; National Breast Cancer Foundation, 2021). Meanwhile, in the Asia-Pacific region, the highest incidence occurs in China (46%) and Japan (14%), followed by Indonesia (12%; Espina et al., 2017). Meanwhile, Malaysia experienced a high rate of unstaged breast cancer, at 36% (Youlden et al., 2014). Thus, it is important to initiate early screening for breast cancer (Cherchiglia de Moraes et al., 2017).

A study in Nigeria by Yakubu et al. (2014) highlighted that nurses have little knowledge regarding screening methods for breast cancer, as none of them can explain their purpose due to inadequate sources of information. Hence, Ramathuba et al. (2015) emphasised the importance of awareness of breast cancer risk factors among health personnel to guide patients in early screening. Fotedar et al. (2013) asserted that female nurses are most

suitable for disseminating breast cancer knowledge to women.

Furthermore, Yakubu et al. (2014) agreed that nurses who lack knowledge of the correct timing and screening methods for breast cancer would indirectly affect the information delivered to patients. However, they revealed that nurses from the surgical ward and close to surgeons and physicians involved in education programmes and seminars were more confident, motivated, and aware of the correct time to perform screening methods for early detection.

A local study addressed that although nurses are well equipped with the knowledge of breast self-examination (BSE), only 35.1% perform it monthly as recommended by the Ministry of Health, Malaysia (Raja Lexshimi et al., 2014). Gupta et al. (2020) highlighted the lack of self-practice in a systematic review among healthcare professionals and Karayurt et al. (2010) believes that this hinders the spread of breast cancer awareness. There are limited intervention findings on breast cancer awareness among nurses.

The preliminary findings among nurses at Sultan Ahmad Shah Centre (SASMEC), Kuantan, Pahang, highlighted a moderate score on the awareness and practice towards BSE (Siti Noorkhairina et al., 2020). Thus, the current study is performed to follow up on the retention of knowledge (K), awareness (A), and BSE practice (P) among SASMEC @IIUM staff nurses after six months.

Materials and Methods:

Participants

A follow-up study was conducted to evaluate the retention of knowledge, awareness, and practice on breast cancer among staff nurses in SASMEC@IIUM, Kuantan, Pahang, post-6-months. Approval from the Kulliyyah of Nursing Post Graduate Research Committee (KNPGRC; Ref: IIUM/313/G/14/3/1) dated 29 November 2019 and 26 August 2020 was obtained. Meanwhile, approval from the International Islamic University Malaysia Research Ethics Committee (IREC) was received; Ref: IIUM/504/11/2/IREC 2020-054 and Ref: IIUM/504/11/2/IREC 2020-KON2, apart from the Clinical Research Centre (CRC) SASMEC @IIUM (Ref: IIUM/423/DEaR/14/3/4).

Settings

Only 30 out of 50 staff nurses were conveniently retained post-6-months due to the COVID-19 pandemic, with a 60% response rate. Other healthcare professionals were excluded from this study.

Measures

The questionnaire comprised of five parts: Part A on sociodemographic data of the nurses, Part B measured the risk factors, while Part C included 10 items on signs and symptoms in a dichotomous choice of 'yes' or 'no'. Meanwhile, 10 items in Part D measured the nurses' awareness of BSE, and Part E described the practice of BSE in extreme ends 10-point Likert scale ranging between 0 points for strongly disagree to 10 points for strongly agree.

The content validity index obtained was 88.33%, with a strong internal consistency of $r^2 = 0.886$ (Siti Noorkhairina et al., 2020; Zamanzadeh et al., 2015). A hardcopy version questionnaire was distributed to the nurses during the preliminary phase after disseminating the study information and consent acquisition. Later, the Google Form was utilised to substitute for post-evaluation due to the Movement Control Order announced during the COVID-19 pandemic.

A one-day breast cancer awareness webinar about cancer and BSE was given between pre- and post-evaluation under the elective course NURF 4314 Discovery of Sub-specialisation: Patient Education and a representative from the Majlis Kanser Nasional (MAKNA) on 26 August 2020. An informative video recording from the webinar and an online BSE practical session by the MAKNA expert was distributed via email prior to retention evaluation. However, no mechanism was performed to check whether the nurses watched the recording.

Data analysis

The IBM Statistical Package Social Science (SPSS) software version 27.0 was used for analysis. Mean and standard deviation was reported for numerical data, while frequency and percentage represent the categorical data. The Wilcoxon signed-rank test was utilised to compare the pre and posttest scores. The statistical significance value was set at less than 0.05.

Results:

Socio-demographic background

There were a few drop-outs during the follow-up study after 6 months, as one staff nurse quit SASMEC@IIUM and 19 withdrew from the study. Thus, 30 staff nurses were retained (Table 1).

Table 1: Sociodemographic backgrounds of nurses (n=30)

Characteristic	Variable	Pre (n=50)		Post (n=30)	
		Freq (%)	Mean (SD)	Freq (%)	Mean (SD)
Age (years)			29.46 (± 6.79)		30.03 (±7.39)
Gender	Male	9 (18)		4 (13.3)	
	Female	41 (82)		26 (86.7)	
Race	Malay	49 (98)		29 (96.7)	
	Indian	1 (2)		1 (3.3)	
	Chinese	0		0	
	Others	0		0	
Marital status	Single	17 (34)		8 (26.7)	
	Married	33 (66)		20 (66.7)	
	Divorce	0		2 (6.7)	
	Widow	0		0	
Child number			0.48 (±0.84)		0.80 (±1.10)
Family history of cancer	No	38 (76)		22 (73.3)	
	Yes	12 (24)		8 (26.7)	
History of cancer*	Breast Cancer	7 (14)		4 (10.0)	
	Brain Cancer	1 (2)		1 (3.3)	
	Colon Cancer	2 (4)		2 (6.7)	
	Lung Cancer	1 (2)		1 (3.3)	
	Thyroid Cancer	0		1 (3.3)	
	Cervical cancer	1 (2)		0	
Family history of breast cancer	No	42 (84)		26 (86.7)	
	Yes	8 (16)		4 (13.3)	
Education level	Certificate	2 (4)		0 (0)	
	Diploma	16 (32)		12 (40.0)	
	Degree	4 (8)		2 (6.7)	
	Master	0		0	
	PhD	0		0	
	Others (Post Basic)	28 (56)		16 (53.3)	
Specialization**	Critical Care	9 (18)		4 (13.3)	
	Emergency Care	10 (20)		7 (23.3)	
	Midwifery	0		1 (3.3)	
	Perioperative Care	13 (26)		5 (13.3)	
	Audiology	2(4)		0	
	Ear, Nose and Throat	2(4)		0	
	Medical-surgical	5 (10)		0	
	Stoma care	1 (2)		0	
	Ophthalmic	6 (12)		0	
	Psychiatric	2(4)		0	
Working area	Ear Nose Throat (ENT) Clinic	4 (8)		2 (6.7)	
	Emergency and Trauma Department (ETD)	10 (20)		7 (23.3)	
	Intensive Care Unit (ICU)	9 (19)		5 (16.7)	
	Ophthalmology Clinic	6 (12)		4 (13.3)	
	Operation Theatre	13 (26)		9 (30.0)	
	Rehabilitation Unit	0		1 (3.3)	
	Surgery Clinic	5 (10)		2 (6.7)	
	Psychiatric Clinic	2(4)		0	
Clinical experience (years)			6.6 (±6.28)		7.20 (±6.376)

Note:
*participant might answer more than one type of cancer
**participant might answer more than one specialization

Table 2: Knowledge regarding the risk factors of breast cancer (n=30)

Items	Answer	Pre (n=50)	Post (n=30)
		Freq (%)	Freq (%)
The risk of breast cancer increasing with age	No	8 (16)	4 (13.3)
	Yes	**42 (84)**	**26 (86.7)**
Breast cancer is a hereditary disease	No	14 (28)	10 (33.3)
	Yes	36 (72)	20 (66.7)
High fat diet is a risk factor for breast cancer	No	16 (32)	8 (26.7)
	Yes	34 (68)	22 (73.3)
Smoking is a risk factor for breast cancer	No	19 (38)	10 (33.3)
	Yes	31 (62)	20 (66.7)
Alcohol consumption increases the risk of breast cancer	No	14 (28)	10 (33.3)
	Yes	36 (72)	20 (66.7)
Pregnancy after 30 years old increases the risk of breast cancer	No	26 (52)	14 (46.7)
	Yes	24 (48)	16 (53.3)
Having first menstrual cycle before the age of 11 increases your risk of breast cancer	No	32 (64)	18 (60.0)
	Yes	18 (36)	12 (40.0)
Late menopause is a risk factor for breast cancer	No	34 (68)	21 (70.0)
	Yes	16 (32)	9 (30.0)
Stress increases the risk of breast cancer	Yes	36 (72)	21 (70.0)
	No	14 (28)	9 (30.0)
Obesity is one of the risk factors for breast cancer	No	14 (28)	8 (26.7)
	Yes	36 (72)	22 (73.3)
Women who never give birth (nulliparous) are at risk for breast cancer	No	27 (54)	9 (30.0)
	Yes	23 (46)	21 (70.0)
The consumption of contraceptive pills increases the risk of breast cancer	No	26 (52)	11 (36.7)
	Yes	24 (48)	19 (63.3)
Breastfeeding reduces the risk of breast cancer	No	7 (14)	5 (16.7)
	Yes	43 (86)	25 (83.3)
High levels of estrogen hormone increase the risk of breast cancer	No	16 (32)	9 (30.0)
	Yes	34 (68)	21 (70.0)
Breast cancer is a contagious disease	Yes	1 (2)	0
	No	**49 (98)**	**30 (100.0)**
Breast cancer cannot be cured	Yes	11 (22)	4 (13.3)
	No	**39 (78)**	**26 (86.7)**
Breast cancer can cause death	No	8 (16)	3 (10.0)

Knowledge Regarding the Risk Factors of Breast Cancer

All nurses knew that breast cancer is not a contagious disease (100%), could cause death (90%), and risks increased with age yet curable (86.7%) after 6 months (Table 2). The mean total knowledge scores on risk factors are 10.82 ± 3.17 at the pretest and 11.50 ± 2.79 at the posttest, lower than the 50th percentile, indicates a moderate score in this domain but with improvement.

Knowledge Regarding the Sign and Symptoms of Breast Cancer

Most nurses understood that breast swelling (96.7%), mucus discharge from the nipple and ulcers, breast size and shape changes, along with weight loss (93.3%), are the sign and symptoms of breast cancer (Table 3). The mean total knowledge score was 8.18 ± 1.69 (pretest) and 8.30 ±1.80 (posttest), lower than the 50th percentile, indicating a moderate score in this domain.

Awareness Regarding Breast Cancer and Early Breast Cancer Screening Test: Breast Self-Examination

The mean total awareness score obtained was 74.04 ± 25.07, lower than the 50th percentile (83.50) at the pretest and 70.63 ±29.09 at the posttest, lower than the 50th percentile (82.50). This indicated a moderate awareness of breast cancer and BSE.

Table 3: Knowledge regarding the sign and symptoms of breast cancer (n=30)

Items	Answer	Pre (n=50)	Post (n=30)
		Freq (%)	Freq (%)
A lump on the breast is a sign of breast cancer	No	10 (20)	13 (43.3)
	Yes	40 (80)	17 (56.7)
Mucus discharge from the nipple shows signs of breast cancer	No	7 (14)	2 (6.7)
	Yes	**43 (86)**	**28 (93.3)**
Pain at the breast is a sign and symptom of breast cancer	No	17 (34)	11 (36.7)
	Yes	33 (66)	19 (63.3)
Changes in the size of one or both breasts are indications of breast cancer	No	4 (8)	2 (6.7)
	Yes	**46 (92)**	**28 (93.3)**
Ulcers on the surface of the breast skin are one of the symptoms of breast cancer	No	9 (18)	2 (6.7)
	Yes	**41 (82)**	**28 (93.3)**
People with breast cancer usually lose weight	No	7 (14)	2 (6.7)
	Yes	**43 (86)**	**28 (93.3)**
Changes in the shape of one or both breasts show signs of breast cancer	No	1 (2)	2 (6.7)
	Yes	49 (98)	28 (93.3)
Inverted breast nipple in one or both breasts showing signs of breast cancer	No	24 (48)	12 (40.0)
	Yes	26 (52)	18 (60.0)
Breast cancer causes the breast to swell and grow	No	5 (10)	1 (3.3)
	Yes	**45 (90)**	**29 (96.7)**
A lump at the armpit is a sign of breast cancer	No	7 (14)	4 (13.3)
	Yes	43 (86)	26 (86.7)

Table 4: Median score for knowledge, awareness and practice domains at pre- and post-6 month after Webinar (n=30)

Domains / Total Score	Median (IqR)		Z-stats[a]	p-value
	Pre-Test	Post-Test		
Knowledge on risk factors	11 (3)	12 (4)	-2.442	**0.015**
Knowledge on sign and symptoms	8 (3)	9 (3)	-1.683	0.092
Awareness on breast cancer and early screening test	81 (27)	79 (31)	-0.184	0.854
Breast cancer practice and BSE	68.5 (41)	79 (31)	-1.389	0.854

Note:
[a]Wilcoxon Signed-Rank Test

Breast Cancer Practice and Early Breast Cancer Screening: Breast Self-Examination

The mean total practice score is 66.62±26.85 at the pretest and 70.83±24.61 at the posttest, indicated a moderate practice of BSE among the nurses but with improvement.

The Association of Knowledge, Awareness, Practice and Breast Self-Examination among Nurses at pre and post-6-month programme

The median score for each KAP domain was reported after normality checking using Kolmogorov-Smirnov and Shapiro-Wilk tests. The median score for knowledge of the risk factors domain is significantly higher (p = 0.015) after 6 months (Table 4).

Discussion:

Studies on pre- and post-intervention of breast cancer awareness among nurses in Malaysia are scarce. The majority of studies conducted were among students and the general population (Akhtari-Zavare et al., 2016; Ali et al., 2019; Yong & Soon, 2017). Therefore, this study compares the findings with the global context. Nurses in this study were in their early 30s (years), female, married and had no family history of breast cancer, similar to the previous studies (Andegiorgish et al., 2018; Erdem &Toktaş, 2016; Jemebere, 2019; Tastan et al., 2011 & Venkatramana et al., 2011).

Nurses in this study exhibited better awareness (100.0% vs. 59.0%) that breast cancer is not contagious and can lead to death, in comparison to a study in Turkiye by Terzioğlu et al. (2017). Meanwhile, Taranikanti et al. (2014) reported poor nurses' knowledge of breast cancer risk factors. In comparison, Gabriel et al. (2016) highlighted that nurses in their study could identify between 60.0% to 77.6% of breast lumps, a lump under the armpit, and changes in breast size and shape, while nurses in the recent study can recognise between 93.3% to 96.7% of breast cancer signs and symptoms. Likewise, Andegiorgish et al. (2018) also reported that a high percentage (76.7% to 89.9%) of nurses recognised the signs and symptoms mentioned above.

Nonetheless, although the findings showed that nurses in this study have moderate awareness of breast cancer and BSE, it could be due to different scoring methods. Terzioğlu et al. (2017) reported a mean of 6.41± 29.09, while Eskandari-Torbaghan et al. (2014) reported a mean of 23.8 ± 4.05 post-intervention among the female medical staff. Meanwhile, Heena et al. (2019) claimed that nurses in their study had low attitudes toward breast cancer screening and BSE. Likewise, the practice of BSE among nurses in this study is moderate, as supported by Erdem and Toktaş (2016), Ghanem et al. (2011), and Jemebere (2019), with 92.6%, 75%, and 71.2%, respectively. On the contrary, Andegiorgish et al. (2018) reported a low percentage (30%) of the practice of breast cancer screening as a preventive measure among nurses in their study.

Overall, a significant moderate improvement is observed in the knowledge level of risk factors after the breast cancer awareness webinar was given along with BSE practice (Siti Noorkhairina et al., 2020, 2021, 2022). This study's efforts align with the need for proper training addressed by Andegiorgish et al. (2018) and Taranikanti et al. (2014) to improve nurses' knowledge in recognising signs and symptoms of breast cancer and early screening measures. Karayurt et al. (2010) proved that the training programme for the trainer of nurses in Turkiye benefitted the nurses and improved the quality of life of breast cancer patients. Therefore, a continuous effort is needed to sustain the dissemination of knowledge, as agreed by Terzioglu (2017).

Conclusion:

The knowledge of breast cancer risk factors was significantly improved after the six-month programme. Therefore, awareness programmes and internal training should be planned regularly. The strength of the study lies in the pre- and post-evaluation despite its small sample size. Future studies should be conducted on a larger scale to determine the causal effect relationship.

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Psychological Impact of Pornography Exposure Among University Students in Kuantan

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Abstract:

Pornography is a medium for sexual pleasure obtained from sources like pictures, videos, audios and written materials. Pornography can cause addiction to the users by stimulating the reward system that will cause significant brain changes similarly seen in drug addiction. Pornographic addiction has become a serious concern in the community worldwide which involves multiple age groups from children, teenagers until adults. This concern is becoming serious as the sources of the pornographic materials are easily available via the internet. Pornography addiction is also shown to give psychological impact to its users. This study was conducted to investigate the psychological impact of pornography usage among university students in Kuantan, Pahang and the comparisons between gender. A descriptive quantitative study was conducted involving 114 college students in Kuantan. An online questionnaire was administered to assess the psychological impact of pornography exposure on anxiety and depression among the respondents. The study showed that more men are significantly involved with pornography compared to women. The common age of first exposure to pornography was between 13 to 17 years old in both genders. Anxiety was higher among those involved with pornography with no differences between gender. Depression was higher among those who consume pornography with a slightly higher percentage of women having moderate to severe depression. This study provides evidence that college students particularly in Kuantan are exposed to pornographic materials. The findings of higher anxiety and depression amongst those who were exposed to pornography suggest that this behavior could negatively affect the wellbeing of students and potentially influence their academic performance.

Introduction:

Pornography addiction is the type of addiction which can be triggered by watching any sexual materials, such as sexually explicit pictures, videos, audios, and written materials (Chowdhury, Chowdhury, Kabir, Perera, & Kader, 2018). It is due to the stimulation and alteration of the brain reward system that are similarly seen in drug addiction (Chowdhury et al., 2018). Brand et al., (2016) demonstrated that the ventral striatum in the brain of a subject lights up when looking at erotic visuals (Figure 1). A functional magnetic resonance imaging (fMRI) study also showed that the activity of ventral striatum among pornographic viewers was elevated when the participants were exposed to something erotic. This suggests that the brain reward system was releasing dopamine (Brand et al., 2016). The release of dopamine will elicit the feeling of pleasure to the users when they watch pornography. As the reward system gets activated when watching pornography, the brain activities will be disturbed and over time, pornography becomes a reliable way to seek pleasure among the users (Brand et al., 2016). Watching pornography excessively could affect the brain and eventually disturb the user's normal brain activity (Chowdhury et al., 2018). The negative outcomes of watching pornography are depression, social isolation, broken relationships, decreased productivity, anxiety, loneliness, self-blame and increased need for mental health support (Fraumeni-McBride, 2019).

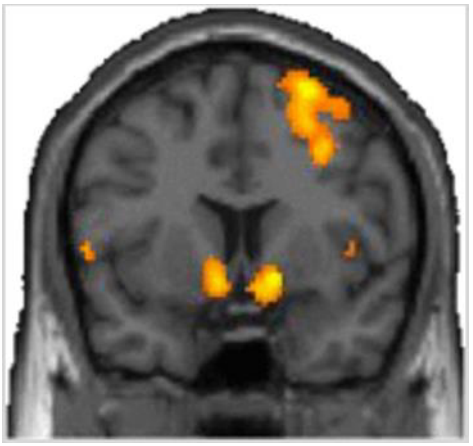

Figure 1. Positive correlation between self-reported pornography addiction and activation of the ventral striatum when watching pornographic materials (Brand et al., 2016).

Currently, pornography addiction is a major concern worldwide, especially in Malaysia since the source of pornographic materials can be easily obtained from the internet. In 2017, Malaysia was ranked at 19th for pornographic searching in PornMD website with approximately 22,000 searches daily (Hawafi et al., 2017). On top of that, about 28,671 teenagers in Malaysia were reported to be addicted to pornography (Hawafi et al., 2017). In 2020, Malaysia ranked fourth globally, for visiting Pornhub website during the 'Movement Control Order' that was enforced by the government on 18th of March 2020 (Fang, 2020).

Pornography addiction is a very serious condition as it can affect mental, behavior, life, marriage and core values of an individual (Chowdhury et al., 2018). Several studies suggested that pornography affected the mental health status of the users (Grubbs, Stauner, Exline, Pargament, & Lindberg, 2015). Pornography addiction was associated with negative thoughts which were characterized by several psychological distress indicators, such as depression, anxiety and perceived stress (Grubbs et al., 2015). A study which included 853 respondents form India showed that 67.3% of the respondents reported to have increased level of anxiety and 58% of them stated that they often felt depressed (Fonceca, Raj & Anandan, 2019). This statement showed that the impact of pornography addiction toward the psychological wellbeing of the users is becoming a serious concern. In this study, the psychological effects of pornography usage among university students and the differences between genders were studied.

Materials and Methods:

This was a descriptive quantitative study. The respondents recruited in this study were university students in Kuantan aged between 18 to 27 years. An online questionnaire using the Google Form was distributed via social networking sites mainly through the WhatsApp application. The questionnaires were distributed for 44 days starting from 10th November 2019 until 23rd December 2019. The questionnaires were designed in both English and Malay language.

The first part of the questionnaire comprised of demographic questions which included gender, age, relationship status and sexual orientation. The second part consisted of questions that assessed cyber pornography usage while the final part comprised of questions that assessed the psychological effect of pornography, particularly anxiety and depression. Depression was assessed using an established diagnostic screening

instrument, the Patient Health Questionnnaire-2 (PHQ2). The severity of depression was categorized based on the total score of the related questions in each item. A score of 1, 2, 3, 4, 5 and >6 represented not depressed at all, not depressed, slightly not depressed, mild depression, moderate depression, and severe depression, respectively. Respondents with a total score of more than three for each item were considered to have depression. Anxiety was assessed by including questions extracted from the Generalized Anxiety Disorder-7 scale. These questions measured the rating by respondents towards the following statements , "how often have you been bothered by ; "feeling nervous, anxious or on edge," and "worrying too much about different things,". The scale provided was between 1 (not at all) to 5 (extremely) (Grubss et. al., 2015). The questions ended by prompting the respondents to relate the signs and symptoms with their pornography activity "do you think all the symptoms is caused by your activity of watching pornography ?".

Descriptive statistics were presented as percentages and where appropriate Chi-square (χ^2) test was used to examine the association between the outcomes and the genders. Data analysis was done using Statistical Package for the Social Sciences (SPSS) and Microsoft Excel. The ethics approval for the study was granted by the Kulliyyah of Pharmacy Postgraduate and Research Committee (Expedite Review No. 10/2019 KEC) dated 12 November 2019.

Results:

A total of 114 students participated in this study in which 33.3% (n=38) were male and 66.7% (n=76) were female. The majority of the respondents were aged between 22-25 years old (71.9%) while the rest were 18-24 years old (27.2%) and more than 25 years old (0.9%).

There were a few studies reported on the prevalence rates of pornography usage between genders. It was reported that 97.8% out of 316 Danish adult men and 79.5% out of 372 Danish adult women had been involved with pornography (Hald, 2006). The pattern of pornography usage among the respondents were analyzed and presented in Table 1 (Appendix). Most of the variables related to the usage of pornography were found to show a significant difference between genders. Higher percentage of men was found to have ever watched pornography with 92.11% (n=35) compared to women 50.00% (n=38) from the total of 114 respondents. Among the 35 men who have watched pornography, 42.86% (n=15) of them recorded their last activity within the last one week. On the other hand, from 38 women who have watched pornography, 28.95% (n=11) of them were found to be watching pornography within the last 6 months of completing the questionnaire. Compared to women, it was found that men used pornography more often than women based on the frequency of watching pornography in which 37.14% (n=13) of men reported to watched pornography three times or more in a week as compared to women at only 18.42% (n=7) (Table 1-Appendix). This observation was similar with few other findings that also presented with a higher percentage of usage among male compared to female respondents (Chowdhury et al., 2018; Hald, 2006). Apart from the usage of pornography, the interpersonal context of use was also identified in this study. The preference to watch pornography alone showed the highest percentage in both genders (Table 1-Appendix). The observation on the preference of men to watch pornography alone was similar with the result presented by Hald (2006). However, in women, this observation contradicts with another study that found the percentage of women who chose to watch pornography with their romantic partner was higher than the percentage of women who prefer to watch pornography alone (Hald, 2006).

The medium and age of the participants being exposed to pornography was also identified and studied. Based on a study done in Malaysia, it was reported that social networking such as Facebook, Twitter, Linkedin, MySpace and Instagram were some of the mediums in which the youth started to get involved in sexual activities (Senadjki, Rahim & Lee, 2019). In this study, both genders were first exposed to pornography during the secondary school age (13-17 years old). The majority of women received the exposure on pornography through mass media while men experienced pornography through friends (Table 2-Appendix). The finding on the range of age at first exposure to pornography is in accordance with the previous study from Hald (2006) which also found that the common age of exposure was >13 years old. Many of these youths started to seek for any form of sexual information, engagement online at the age of 14 years old or older because this is the age of curiosity on their sexual development from various aspects, physical, emotional and social (Ybarra & Mitchell, 2005).

A study conducted among 688 Danish adults reported that younger age of first exposure to

pornography can be one of the strong predictors of pornography consumptions (Hald, 2006). In this present study, a small percentage of women at 5.26% (n=2) were exposed to pornography at an earlier age than men which was less than 5 years old. This finding was not in correspondence with Hald (2006) which found that men were exposed to pornography at an earlier age than women. It was interesting to note that one of the respondents from this study who were exposed to pornography at the age of less than 5 years old was highly associated with pornography addiction. This is based on her frequency of watching pornography, which was three times per week or more. This respondent was found to have severe depression and extreme symptoms of anxiety. The respondent also stated that she experienced the symptoms of anxiety and depression due to the struggling to control her own desire toward pornography. On a contrary, another respondent who has been exposed to pornography at an early age was not highly addicted to pornography based on her frequency of watching pornography of less than once per month. This repondent did not report experiencing any extreme symptoms of anxiety but has been classified to have mild depression. The repondent also reported that other factor that might contribute to the depression is her studies. Hence, based on only these two respondents, a conclusive correlation between the age at first exposure to pornography and pornography addiction effects cannot be made.

Apart from the usage and exposure of pornography among the respondents, the most important aspect of concern is the psychological effects of watching pornography. The psychological effects addressed this study were the effects of anxiety and depression caused by watching pornography. These two aspects were studied because watching pornography may induce anxiety and depression to the users due to the relation of the amygdala function and human addictive behaviors (Gola, Miyakoshi & Sescousse, 2015). Pornography can affect the mesolimbic dopamine pathway that connects with the reward system in the brain (Love et al., 2015). The dopamine flood caused by the pornography leads to an activation of the extended amygdala that is responsible for pain processing and fear conditioning (Love et al., 2015). The resulting negative emotional state stimulated by the amygdala leads to the activation of brain stress systems and dysregulation of anti-stress systems (Love et al., 2015). Hence, pornography addictive behavior can lead to psychological stress among the users.

For anxiety, the percentage of respondents who experienced the symptoms of anxiety such as feeling of nervousness or shakiness, feeling tense, terror or panic and feeling of restlessness among those who watched pornography were identified. The finding showed that those who watched pornography showed a higher percentage of experiencing all these symptoms compared to those who do not watch pornography in both genders (Table 3-Appendix). However, among those who watched pornography, the percentage of men and women who experienced the symptoms of anxiety was similar and did not show any significant differences (Table 3-Appendix).

Despite the result showing higher percentage of anxiety among those watching pornography, it cannot be deduced that pornography is the sole factor that contributes to the anxiety as some of the respondents claimed that there were other factors contributing to their anxiety and depressive symptoms. Some of the factors mentioned were studies, low grade results, family issues and friends. On the other hand, for all the anxiety symptoms, those who did not watch pornography in both genders had no extreme symptoms of anxiety (Table 3-Appendix). Hence, this result reflects that the symptoms of anxiety were low among those who are not involved with pornography.

Apart from anxiety, the connection of pornography to the depressive symptoms was also investigated in this study. The effect of pornography to depression was studied because the use of sexually explicit material appears to be linked to higher rates of depression (Willoughby, Busby & Young-Petersen, 2018). A study suggested that youths and individuals often have negative perception about pornography (Willoughby et al., 2018). Hence, those who are involved in pornography will experience the feeling of guilt when they are unable to stop watching pornography which may lead to depression (Willoughby et al., 2018). Another study suggested that psychological change happened when someone discovered their addiction toward pornography, and they tried to stop the action abruptly because of feeling ashamed and this will consequently lead to the depression (Schneider, 2000).

The symptoms of depression such as the thoughts of ending life, feeling lonely and feeling worthlessness were asked in this study to identify the depressive symptoms among the respondents related to the usage of pornography. The finding showed that the

percentage of respondents in both genders who have the thoughts of ending their lives are comparably higher among those watching pornography than those who have not (Table 4-Appendix). According to Lin et al. (2014), adults with internet addiction were more likely to be associated with suicidal thoughts and attempts. The internet addictions included in the study were pornography, gaming, gambling and etcetera (Lin et al., 2014). This suggests that pornography addiction may lead to a negative impact to the mental health among those watching pornographic materials.

Similarly, the other two symptoms of depression which are feeling lonely and feeling worthlessness also showed a higher percentage among those watching pornography (Table 4-Appendix). The severity of depression was measured using the Patient Health Questionnnaire-2 (PHQ2) which involves two questions about the feeling of down, depressed, or hopeless and having little interest or pleasure in doing things. Based on the result, among those who were involved with pornography, the percentage of women having moderate to severe depression was higher than men at 31.58% (n=12) and 20% (n=7) respectively. Apart from that, the percentages of respondents having depression were higher among those watching pornography compared to those who have not watched pornography (Table 4-Appendix). Despite the result showing higher percentage of depression among those watching pornography, it cannot be concluded that pornography was the only contributor to depression as some of them claimed that there were other factors contributing to their depressive symptoms such as studies, low grade results, low self-esteem, family issues and friends.

Our finding that demonstrated pornography was associated with depressive symptoms was similar to a study by Willoughby et al. (2018). The authors found individuals that were involved in watching pornography regularly had a significantly higher level of depressive symptoms compared to those who did not watch pornography, and the latter group was linked to a more positive mental health outcome (Willoughby et al., 2018). The symptoms of both depression and anxiety were highly associated with addictive behavior of human in which they will usually present with withdrawal symptoms once pornographic materials are halted for a certain period of time (Garcia & Thibaut, 2010). The withdrawal symptoms that might be experienced by the pornographic addicted users include anxiety, depression, rumination and guilt related to a reduction of sexual activities, as well as difficulties to stop or reduce the frequency of sexual activities (Garcia & Thibaut, 2010).

The current study also examined the sexual orientation of the respondents. We have found that although the majority of the respondents were heterosexual (90.4%, n=103), there were also respondents with other sexual orientation which were bisexual (7.9%, n=9) and homosexual (1.8%, n=2). Among the bisexual and homosexual respondents, 90.9% of them admitted having watched pornography. Schrimshaw et al. (2016) studied 265 men who reported to have sexual intercourse with another man in the past 12 months and found a correlation between exposure to sexually explicit media and sexual orientation. These men aged more than 17 years old also admitted that they practiced Male-sex-Male (MSM) activity and have watched MSM pornographic materials in the past 3 months (Schrimshaw et al., 2016). The authors also reported 81.5% of them who self-identified themselves as gay orhomosexual admitted that they were influenced by the pornography content which led them to fantasize and apply the same behaviors that indirectly contributed to the change of their sexual orientation (Schrimshaw et al., 2016). The authors demonstrated that 93% of the participants agreed that they always think about doing similar acts as what they have seen in the pornographic materials and 70% of them reported that they actually did the things that they viewed in the sexually explicit materials with other men (Schrimshaw et al., 2016).

Nevertheless, in our study, the correlation between pornographic usage and the contribution to sexual orientation cannot be made. There was no question asked whether pornography affect their sexual orientation and only 11 respondents out of the total respondents reported having abnormal sexual orientation. Further study is required to identify if there is a strong correlation between sexual orientation and pornographic materials usage in our population and how this information can be used to strengthen the public sexual education, parenting and awareness on the danger of pornography. Apart from that, our limitation of this study included the use of a small, cross-sectional sample. Therefore, it does not portray the real situation of pornography addiction among the university students in Kuantan.

Conclusion:

Our study provides an overview on the online pornography usage among university students in Kuantan. A significant proportion of male respondents were reported to be involved in pornography compared to females. The common age at first exposure to pornography in both genders was 13-17 years old. The symptoms of anxiety among those watching pornography were similar in both genders but a higher percentage was noted in those who were involved with pornography. The percentage of women with moderate and severe depression was slightly higher than men among those watching pornography and the percentages in both genders was higher compared to those who were not involved with pornography. This study provides evidence that university students particularly in Kuantan are exposed to pornographic materials. The findings of higher anxiety and depression amongst those who were exposed to pornography suggests that this behavior could negatively affect the wellbeing of students and potentially influence their academic performance. Despite the result showing high percentage of anxiety and depression among those watching pornography, it cannot be concluded that pornography was the sole contributor to these psychological changes as some of the respondents claimed that there were other factors contributing to the anxiety and depressive symptoms such as studies, low grade results, low self-esteem, family issues and friends. Further research is needed to fully explore the relationship of pornography addiction and its psychological effects in both genders. Future studies should consider a larger nationally representative sample.

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Table 1-Appendix

Table 1 Cyber Pornography Usage (in %)			
Variables	Men	Women	Pearson's $\chi 2$ Test
1. Have you ever watch pornography?			
Yes	92.11 (35)	50.00 (38)	$\chi 2$= 20.654*, df=2
No	2.63 (1)	40.79 (31)	
I do not know	5.26 (2)	9.21 (7)	
2. If Yes: You have watched pornography within the last			
6 months	14.29 (5)	28.95 (11)	$\chi 2$= 4.186, df=4
1 month	8.57 (3)	15.79 (6)	
Week	42.86 (15)	26.32 (10)	
24 hours	28.57 (10)	23.68 (9)	
3.Frequency of pornographic use			
Less than once a month	11.43 (4)	31.58 (12)	$\chi 2$= 7.389, df=4
1–2 times per month	25.71 (9)	28.95 (11)	
1–2 times per week	17.14 (6)	7.89 (3)	
3 times per week or more	37.14 (13)	18.42 (7)	
4. I used to watch pornography			
Alone	97.14 (34)	94.74 (36)	$\chi 2$= 19.029, df=4
With romantic partner	0.00 (0)	5.26 (2)	
With friends	0.00 (0)	0.00 (0)	
With stranger/online friends	0.00 (0)	0.00 (0)	

*$p < 0.001$, numbers in parentheses represent n/cell.

Knowledge, Attitude and Practice (KAP) Regarding Exercise Among IIUM Kuantan Campus Staff

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Abstract:

Introduction: Low levels of exercise can lead to obesity and weight gain and this may lead to a higher risk of heart disease and diabetes mellitus. Malaysia was ranked as number one of the fattest nations in South-East Asia and sixth in the Asia Pacific Region and low exercise activity in the Malaysian population could be one of the factors. **Objective:** This study was conducted to understand the knowledge, attitude and practice of exercise in a small Malaysian population and to assess the relationship between attitude and practice of exercise. **Method:** Data was collected through a structured questionnaire. The study population was IIUM staff from various kulliyyah at IIUM Kuantan campus. Subjects were recruited through email. A total of 64 subjects responded, gave their consent and answered the questionnaire. **Results:** There is a correlation between attitude towards physical activity and its practice (r=0.322, n=64, p=0.009). **Conclusion:** In general, people in IIUM Kuantan have adequate knowledge as 57% of the questions were answered correctly, a positive attitude towards exercise and a good practice of exercise but with some room for improvement.

Keywords: Knowledge, Attitude, Practice, Exercise, IIUM, Staffs

Introduction:

According to the World Health Organization (WHO), obesity and overweight are growing health problems around the world (WHO, 2018). The prevalence of obesity is showing an increasing trend throughout the years where it was estimated that 1.9 billion adults and 150 million children (5-19 years old) worldwide were obese in the year 2020 (World Health Organization, 2021). One of the major contributors to obesity is physical inactivity (Chan and Woo, 2010).

Weight gain occurs when our dietary intake levels are over the energy expenditure that is used daily by our body (Mozaffarain, et al., 2011). Excessive glucose that is not being used will be stored in the liver as glycogen and some of it will be converted into fatty acids to be stored as fat in the adipose tissues and other parts of our body (Alsharari et al., 2019). By expending the energy that has been consumed, it can affect weight change. Therefore, by exercising, weight loss can be achieved as it takes the fat out of the fat cells and converts it into energy for the muscles (Mozaffarain et.al, 2011). Exercising also burns up all those available excess sugars that are stored in the adipose tissue as fat. Moreover, exercising will not only remove fat but also build muscle (Thomas and Burns, 2016).

A study in the Malaysian population had shown that the prevalence of physical inactivity among adults (aged 18 years and above) was 24.6%, which is higher when compared to other countries in this region (Alias et al. 2022). Generally, the level of physical activity in the Malaysian population is associated with ethnicity, formal education, smoking status, income status and occupation among others (Nik-Nasir et al., 2022). Additionally, physical inactivity was mainly contributed to busy schedule, followed by exhaustion and lack of motivation as shown in a study done among the university students in Malaysia (Saleem et al. 2018). These factors might vary in different study population.

The question arises whether people's knowledge will modify their behaviour towards a particular activity, as for this study: exercise. Thus, this study aimed to understand the level of knowledge towards exercise in this study population and to evaluate whether knowledge contributes to attitude and their exercise routine. The data will help to create a programme that will be beneficial towards the study population. In addition, the data from this study also may reveal misconceptions or misunderstandings that may represent obstacles to the activities that would like to be implemented and potential barriers to behaviour change especially towards exercise.

Materials and Methods:

Ethical Approval

This study by approved by IIUM Research Ethical Committee (IREC) with a reference number of IREC 2020-BS(KAHS).

Subjects

The respondents in this study were academic and non-academic staff in IIUM Kuantan Campus. There were staff from the Kulliyyah of Allied Health Sciences, Kulliyyah of Medicine, Kulliyyah of Science, Kulliyyah of Pharmacy, Kulliyyah of Nursing and Kulliyyah of Dentistry. A convenience sampling method was applied where the staff from each kulliyyah (or faculty) were emailed and invited to participate in the study. Any IIUM staff working in Kuantan Campus were eligible for this study, except those with any history of physical abnormality or disability which impedes them from doing any exercise. This was mentioned in the consent form which the respondents must read and comply with before they give their responses to the questionnaire used in this study.

Questionnaire

A questionnaire to assess the knowledge, attitude, and practices on exercise was adapted from a study done by Afif et al. (2016). The questionnaire was divided into three sections i.e A, B, and C. Section A consists of sociodemographic variables. The questions included in this section were gender, age, educational level, marital status, chronic illness, gym memberships, recreation groups and societies, kulliyyah, mahallah, offices, centers, institutes and divisions of IIUM (K/C/D/I/O). Section B consists of questions regarding knowledge and attitude regarding exercise. It consists of common knowledge on exercise, such as the definition of exercise and the facts about exercise, while the attitude towards exercise taps perception, belief, and preferences regarding exercise. Responses in section B were categorised as true, false, and neutral. Section C included questions that provided data on the regularity of exercise and type of exercise, and also reasons for not exercising. The scoring system for positive statements for each section was as follows: totally disagree=1, disagree=2, neutral=3, agree=4, strongly agree=5. The questionnaire was distributed through the Google Forms, with a comment section at the end of the questionnaire. A

Gmail account was required before answering the questionnaire to prevent repeated answers. Upon receiving consent from the participants, the questionnaire was given to them through email to be filled up.

Questionnaire Validation

A qualitative pilot study was conducted with 30 participants from IIUM that consisted of lecturers and students to check for face validity. They were not included in the study population. The findings from the pilot study were used to improve the questionnaire to be better understood by the study subjects.

Data Analysis

The data were analysed using Statistical Package for Social Sciences (SPSS). The correlation test was used to determine the association between knowledge, attitude, and practice toward the benefits of physical activity. *p*-value of less than 0.05 was taken as a significant value.

Results:

The demographic characteristics of the respondents is shown in Table 1. A total of 64 subjects were recruited for this study. Out of the total subjects, 73.4% (n=47) were female and 26.6% (n=17) were male. The majority of the subjects were in the age group of 31 to 40 years old (57.8%), married (73.4%), Ph.D holder (75%), have no chronic illnesses (93.8%) and do not hold any gym membership (95.3%) or belong to any recreational group (84.4%).

Table 1: Demographic Characteristics of Respondents (n = 64).

Variables		n (%)
Gender	Female	47 (73.4)
	Male	17 (26.6)
Age	30 and below	6 (9.4)
	31 to 40	37 (57.8)
	41 to 50	18 (28.1)
	Above 50	3 (4.8)
Marital status	Married	47 (73.4)
	Single	15 (23.4)
	Widowed	1 (1.6)
	Divorced	1 (1.6)
Education	Degree	2 (3.1)
	Master	14 (21.9)
	PhD	48 (75)
Chronic Illness	No	60 (93.8)
	Yes	4 (6.3)
Gym membership	No	61 (95.3)
	Yes	3 (4.7)
Recreational group	No	54 (84.4)
	Yes	10 (15.6)

The respondent's knowledge on exercise is shown in Table 2 and 3. All subjects understood that exercise can help to combat diseases, improve moods, strengthen body endurance and stamina, relieve stress and yield a healthy body. However, 1.6% of the subjects were not sure whether exercise can make life happier and whether exercise can build a fit body. About 48.4% (n=31) of the subjects understood that adults with chronic conditions should do muscle strengthening exercises, whereas 18.8% (n=12) agreed that adults with chronic conditions should not do muscle strengthening exercise and the remaining 32.8% (n=21) were not sure. Around 51.6% (n=33) of the subjects agreed that adults should do at least 150 minutes a week of moderate exercise and the remaining 18.8% (n=12) and 29.7% (n=19) disagreed and were not sure about the statement, respectively. A total of 87.5% (n=56) subjects did not agree that exercise increases the chance of stroke and other circulation problems, whereas 7.8% (n=5) agreed and the remaining 4.7% (n=3) were not sure about the statement.

The majority of subjects disagreed that iron loss [48.4% (n=31)] and vitamin loss [54.7% (n=35)] occur after exercise. Whereas a lesser percentage agreed that iron [10.9% (n=7)] and vitamin [12.5% (8)] are lost after exercise and the remaining 40.6% (n=26) and 32.8% (n=21) were not sure about both

statements. Almost all subjects [78.1% (n=50)] agreed that significant injuries can occur from physical activity and 6.3% (n=4) were not sure about the statement and the remaining subjects or 15.6% (n=10) disagreed with the statement. Only 23.4% (n=15) of the subjects agreed that doing more than 300 minutes a week of moderate intensity exercise is more harmful than beneficial. On the other hand, 21.9% (n=14) and 54.7% (n=35) of the subjects did not agree and were not sure about the statement, respectively.

Table 2: Knowledge of participants regarding the benefits of exercise (n = 64).

Statements	n (%)		
	True	False	Not sure
Exercise helps to combat many diseases.	64 (100.0)	0 (0.0)	0 (0.0)
Exercise improves mood after doing some exercise.	64 (100.0)	0 (0.0)	0 (0.0)
Exercise can strengthen endurance and stamina.	64 (100.0)	0 (0.0)	0 (0.0)
Doing some exercise makes life happier.	63 (98.4)	0 (0.0)	1 (1.6)
Adults with chronic conditions should do muscle strengthening exercise.	31 (48.4)	12 (18.8)	21 (32.8)
Exercise is able to relieve stress.	64 (100.0)	0 (0.0)	0 (0.0)
Do some exercise can yield healthy body.	64 (100.0)	0 (0.0)	0 (0.0)
Exercise can build a fit body.	63 (98.4)	0 (0.0)	1 (1.6)
Adults should do at least 150 minutes a week of moderate intensity exercise.	33 (51.6)	12 (18.8)	19 (29.7)

Table 3: Knowledge of Respondents Regarding the Disadvantage of Exercise (n=64).

Statements	n (%)		
	True	False	Not sure
Exercise increases chance of stroke and other circulation problem.	5 (7.8)	56 (87.5)	3 (4.7)
There is iron loss after exercise.	7 (10.9)	31 (48.4)	26 (40.6)
There is vitamin loss after exercise.	8 (12.5)	35 (54.7)	21 (32.8)
Significant injuries can occur from physical activity.	50 (78.1)	10 (15.6)	4 (6.3)
Doing more than 300 minutes a week of moderate intensity exercise is more harmful than beneficial.	15 (23.4)	14 (21.9)	35 (54.7)

The attitude of subject towards exercise is shown in Table 4. The majority of the subjects disagreed that exercise is a stressful activity (42.2%), disagreed that exercise leads to exhaustion (29.7%), agreed that exercise is a way to have fun (54.7%) and strongly agreed that they exercise to improve health (62.5%), increase fitness level (62.%%), wanted to look good (53.1%) and wanted to control weight (51.6%). Furthermore, majority of the subjects disagreed that socializing is the reason they exercise (32.8%), disagreed that they will exercise only if there is a company (37.5%), strongly disagreed that exercise is only for overweight people (78.1%), disagreed of being afraid of getting injured during exercise (32.8%), disagreed that they are too busy to exercise (35.9%), agreed that people who don't exercise are lazy (31.3%), agreed that exercise is part of being a good Muslim (53.1%), agreed that they were happy with their physical condition (51.6%) and agreed that they were happy with their life (62.5%).

With regard to practice, the results showed most subjects exercise at least once a month whereas only 7.7% did not do any exercise. As shown in Table 5, almost equal number of subjects exercised 1-4 times a month (30.8%), 5-12 times a month (30.7%) and more than 12 times a month (29.2%). There was variation when it comes to the type of exercise conducted by the subjects (Table 6). The activity mostly preferred by the subjects was walking (20%), followed by jogging (18.5%), aerobic exercise (13.8%), multiple exercises (12.3%), workout (9.2%), and cycling (4.6%).

Table 4: Attitude of Respondents Regarding Exercise (n = 64).

Statements	n (%)				
	Strongly agree	Agree	Uncertain/ Neutral	Strongly Disagree	Disagree
Exercise is a stressful activity.	0 (0.0)	5 (7.8)	12 (18.8)	21 (32.8)	27 (42.2)
Exercise causes people to be exhausted.	4 (1.6)	24 (37.5)	7 (10.9)	10 (15.6)	19 (29.7)
Exercise is one of the ways for me to have fun.	23 (35.9)	35 (54.7)	4 (6.3)	0 (0.0)	2 (3.1)
I exercise because I want to improve my health.	40 (62.5)	22 (34.4)	2 (3.1)	0 (0.0)	0 (0.0)
I exercise because I want to increase my fitness level.	40 (62.5)	22 (34.4)	2 (3.1)	0 (0.0)	0 (0.0)
I exercise because I want to look good.	34 (53.1)	24 (37.5)	2 (3.1)	0 (0.0)	4 (6.3)
Socializing is the reason why I exercise	5 (7.8)	20 (31.3)	14 (21.9)	4 (6.3)	21 (32.8)
I exercise because I want to control my weight.	33 (51.6)	27 (42.2)	1 (1.6)	0 (0.0)	3 (4.7)
I will exercise only if someone is accompanying me.	5 (7.8)	6 (9.4)	8 (12.5)	21 (32.8)	24 (37.5)
Exercise is only for overweight people.	1 (1.6)	0 (0.0)	0 (0.0)	50 (78.1)	13 (20.3)
I am afraid of getting injured when I exercise.	2 (3.1)	18 (28.1)	11 (17.2)	12 (18.8)	21 (32.8)
I am too busy to exercise.	8 (12.5)	16 (25.0)	13 (20.3)	5 (7.8)	23 (35.9)
People who don't exercise are lazy.	5 (7.8)	20 (31.3)	15 (23.4)	10 (15.6)	14 (21.9)
Exercise is part of being a good Muslim	26 (40.6)	34 (53.1)	3 (4.7)	1 (1.6)	0 (0.0)
I am happy with my physical conditions.	4 (6.3)	33 (51.6)	13 (20.3)	2 (3.1)	12 (18.8)
I'm happy with my life	20 (31.3)	40 (62.5)	4 (6.3)	0 (0.0)	0 (0.0)

Table 5: Frequency of Exercising Per Month (n = 64)

Frequency of Exercising per month	n (%)
0	5 (7.7)
1-4 times	20 (30.8)
5-12 times	20 (30.7)
>12 times	19 (29.2)

Table 6: Type of Exercise Conducted by the Respondents (n = 64).

Type of Exercise	n (%)
Aerobic exercise	9 (13.8)
Cycling	3 (4.6)
High Intensity Interval Training	4 (6.2)
Jogging	12 (18.5)
Multiple exercise	8 (12.3)
Walking	13 (20.0)
Workout	6 (9.2)
Yoga	3 (4.6)
Others	6 (9.2)

Table 7: Factors that Could Prevent Exercise (n = 64).

Factors	n (%)
There is no safe place	4 (10.8)
Health problems	3 (8.1)
It involves a lot money	3 (8.1)
Lack of energy and tired	11 (29.7)
I have many responsibilities such as childcare and work	27 (73.0)
Other reasons	13 (35.1)

Table 8: Correlation between Attitude towards Exercise and Its Practice (n = 64).

	Frequency of Exercise	*p* value
Attitude towards exercise	$r = 0.322$	0.009

Discussion:

Knowledge can be defined as information that is organized, synthesized, or summarized to enhance comprehension, awareness, or understanding. It also has been defined as information combined with experience, context, interpretation, reflection, intuition, and creativity (Faizuniah, et al., 2013). Thus, knowledge in terms of knowing what is happening to the body such as understanding the mechanism of how fat is metabolised in the body due to exercise is imperative in this study. Most importantly, will this knowledge affect people's attitude and practice towards exercise?

Based on a sociological perspective, attitude is defined as the verbal expression or as an intention to act (Harris, 2011). Descriptive Psychology addresses behaviour as an attempt on the part of an individual to bring about some state of affairs either to effect a change from one state of affairs to another or to maintain a currently existing one (Bergner, 2011). As such, it is important to know whether attitude or perception also will drive our study population to exercise.

From the analysis, none of the subjects disputed the benefits of exercise towards health because the majority of them have a good knowledge of exercise. This is in line with the educational background whereby many of the subjects hold a master's degree or up to a PhD level. Even though the subjects were knowledgeable on the benefit of exercise, there were facts about exercise that most of them did not know. For instance, almost half of the subjects were not aware that adults with chronic conditions should still do muscle strengthening exercises or adults should do at least 150 minutes a week of moderate intensity exercise. This was based on WHO 2020 guidelines on physical activity and sedentary behaviour. Based on these guidelines, it was recommended that all adults (18-64 years) including those with chronic conditions and disability should conduct a regular exercise at least 150-300 min of moderate-intensity aerobic exercise or equivalent per week due to better health outcomes such as reduce mortality related with cardiovascular diseases, hypertension, diabetes mellitus and improve cognitive health and sleep among others (Bull et al. 2020)

Almost all of the subjects also did not realise that there are iron and vitamin loss after exercise and doing more than 300 minutes a week of moderate intensity exercise is more harmful than beneficial. The number of subjects that were not aware of these facts was higher compared to the previous study (Afif, et al., 2016). This implies that creating awareness on this matter is important to prevent harm following any exercise. It is also vital for the public to consume enough vitamins and iron in their daily diet while being physically active. With a balanced diet and staying active, a healthy body and mind can be yielded (Myers, 2003; Warburton, et al., 2006; Eather, et al., 2013).

The subjects had good general knowledge regarding the benefits of exercise in producing a quality life and it was reflected by their practise of exercising at least once a week. However, there are still too many subjects who did not understand the importance of exercising, regularly and doing it in a proper way. Thus, it is important to have adequate knowledge on

exercise to get the whole benefits from the physical activity (Fredriksson, et al., 2018).

Moreover, the majority of the subjects have a good attitude towards exercise. Most subjects dened exercise is a stressful activity as the majority of the them agreed that exercise is one of the ways to bring fun even though they know that exercise will lead to exhaustion. Previous studies had shown that three factors that motivate people to exercise namely for better health, fitness and body image (Kazem, et al., 2017). These could be the reasons that drive the subjects to exercise. Additionally, weight loss is also associated with exercise (Carla, 2017) and many of the subjects used that as their motivation. The subjects had a good attitude as they all agreed that exercise is not only for overweight people.

The good attitude of the subjects towards exercise was reflected in their practice where there was a significant positive correlation between attitude towards exercise and frequency of exercising. This indicates that subjects with more positive attitudes towards exercise will be more likely to be engaged with physical activity.

About the type of exercise preferred by the subjects, walking was the most preferred followed by jogging. This can be related to factors that deterred people to do exercise agreed by some of the subjects where exercise involves a lot of money and there is no safe place to do exercise. Walking and jogging are two activities that require money and do not cost a lot to take part. One just needs to have a good pair of shoes. These activities also can be done basically at many potentially safe places such as community parks and around the neighbourhood. Moreover, studies had shown that walking (reviewed Hanson and Jones, 2015) and jogging (Zhang, et al., 2019) have positive impacts on physical and psychological well-being and might surpass another type of so-called 'high-end' exercise.

Despite having good knowledge, attitude and practice among our study population, the frequency of exercising also varies greatly ie. from once a month to more than 12 times a month. Additionally, a small percentage of the subjects led sedentary lifestyles. The variation could be explained by reasons agreed by most subjects for not exercising. Many of them agreed that time constraints due to work and family demands made them unable to spend time for exercise. This could be a common reason for people to be sedentary because previous study also showed similar findings (Afif, et al., 2016). Apart from that, almost one-third of the subjects were afraid of getting injured during exercise. This may put them off from being physically active.

There were many programmes conducted at IIUM Kuantan campus that aimed to promote exercise to the staff. Maximal participants could be achieved if the program is devised based on the needs of staff or does not involve factors that will prevent them from joining. For example, a light exercise programme such as a fun run conducted during the school break over the weekend would be preferable. In summary, it is hoped that data from this study could give more insight into recruiting more participation from the staff in any exercise programme.

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A survey on eye examination and eyewear experience from a client perspective in Malaysia

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Abstract:

Introduction: A successful practitioner-client experience is vital for optimal eye care outcomes. Previous research has mainly highlighted optometry services or facilities from the practitioner's perspective. Information on the eye examination and eyewear experience from a client's perspective in Malaysia, is scarce. **Aim**: The study aimed to gather information on the eye examination and eyewear experience from the client's perspective. **Methodology:** The findings reported in this paper are derived from an interview study conducted with a sample of 408 respondents from 12 states and three federal territories in Malaysia. **Results**: In the overall eye test experience, 39% narrated positive feelings, and 35% described neutral feelings. Only a small percentage reported their overall eye test experience negatively (5%). Approximately 21% stated a mixed experience of both positive and negative feelings. Nearly half (49%) of respondents did not know who tested their eyes. The majority believed that vision could affect their quality of life (71%). The five most frequent complaints about eyewear were physical limitations of spectacles, inconvenience of misplacement, sensation discomfort of pressure on face surface, visual adaptation challenges and cost issues. The majority of respondents expected improvement in service (39.71%), better instruction (22.55%), shorter duration (14.22%), and a reduction in total tests (12.75%). **Conclusion**: This survey will help eye care practitioners understand the client experience and the need to improve eye care services.

Keywords: Eye examination, eyewear experience, primary health eye care, optometry practice

Introduction:

There are plenty of studies on the utilisation of eye healthcare services (Ahmad et al., 2015; Park et al., 2017; Donaldson et al., 2018; Varadaraj et al., 2019; Akullo et al., 2020; Barrenechea-Pulache et al. 2021). The eye examination frequency displays a trend of improvement among indigenous people (Foreman et al., 2018) and older adults (Fong et al., 2009) in Australia, as well as generally in the United States (Varadaraj et al., 2019). However, the utilisation of eye healthcare services remains low in Pakistan (Ahmad et al., 2015), South Korea (Park et al., 2017), Peru (Barrenechea-Pulache et al., 2021), South Africa (Akullo et al., 2020). There is apparent unequal distribution as a result of socioeconomic and demographic gaps (Ahmad et al., 2015; Park et al., 2017; Varadaraj et al., 2019; Akuffo et al., 2020; Barrenechea-Pulache et al., 2021). Parental misconceptions about eye care for young children and accessibility barriers are common (Donaldson et al., 2018).

Estimates of visual impairment and its causes from the National Eye Survey in Malaysia (NESII) were conducted in a recent survey (Chew et al., 2018). The prevalence of blindness and visual impairment were 1.2% and 6.9%, respectively. Untreated cataracts (58.6%), diabetic retinopathy (10.4%), and glaucoma (6.6%) were the most typical causes of blindness. Overall, 86.3% of the causes of blindness were avoidable. Therefore, a good eyecare ecosystem is imperative.

In a survey done a decade ago, only 44% of optometrists engaged in comprehensive eye examinations (Mohidin & Hashim, 2011). Most optometric practices were well-equipped with standard equipment related to optometry practice, except for the tonometer and visual field instrument (Mohidin & Hashim, 2011). In a recent study by Abd Aziz et al. (2022), most practices reported having essential optometric tools for visual testing and refraction. The percentages of practices equipped varied: complete trial set (100.0%), illuminated or projected Snellen chart (95.8%), retinoscopy (88.7%), direct ophthalmoscopes (78.9%), slit lamp biomicroscopy (67.6%), keratometry (46.5%) and RAF rules (46.5%). Unavailability of equipment (79.1%), lack of time (59.7%) and dictated by the customers (34.3%) are among the main contributing factors to not practising comprehensive eye examination routinely. In a recent survey on optometrists' practice in Malaysia, only 35.8% reported using evidence in their practice (Zainodin & Jantan, 2020).

To enhance the eye care ecosystem with appropriate practices and policies, it is necessary to have a sophisticated understanding of the needs of practitioners and clients. The experience of vision problem and their treatment can be complex. The client's needs and expectations will inevitably change and evolve in response to changing situations. Previous research mainly highlighted the optometry service or facilities from the eye care practitioner perspective (Mohidin & Hashim, 2011; Zainodin & Jantan, 2020; Abd Aziz et al., 2022). A successful practitioner-client experience is vital for optimal eye care outcomes. The expectations can be dissimilar between eye care practitioners and clients. Eye care practitioners may over-emphasise on delivery of the best eye care, while the clients may prefer practicality. The study aimed to gather information on the eye examination and eyewear experience from the client's perspective. Understanding the impact of the client's views on the eye health practitioner–client relationship is crucial. The client's experience can be referenced and understood.

Materials and Methods:

In this study, survey research was conducted and adhered to the Declaration of Helsinki. Ethical approval [REC/09/2021 (MR/803)] was obtained before data collection. The information about the eye examination and eyewear experience was collected as reported by individuals from September 2021 to April 2022.

The online sample size calculator (Raosoft Sample Size Calculator), which uses Cochran's Sample Size Formula with a confidence interval of 95% and a margin of error of 5%, recommended a sample size of 300 respondents. Informed consent was obtained verbally. The inclusion criteria were those with eye examination experience and eyewear experience (spectacles, contact lenses, sunglass or protective eyewear). Our respondents closely represented Malaysia because they were randomly sampled from twelve states and three federal territories in Malaysia.

All respondents were recruited randomly from public places such as shopping complexes, bus stops, shop lot walkways, recreational parks, etc. Information regarding respondents was obtained before further interviews. A structured interview was conducted through face-to-face interviews with thirty-four interviewers. Each interview was approximately 15 minutes.

Each respondent was interviewed with a set of structured questions as below:

- Have you been to an eye test before?
- Do you know the qualification of the person who tests your eye?
- How do you describe your eye test experience?
    - Describe the part of the eye test you disliked the most.
    - Describe the part of the eye test you were most comfortable with.
    - What is your first eye test experience?
- How does your eyesight affect your daily activities?
- What is your experience with eyewear?
    - How does your eyewear affect your quality of life?
    - What are the common problems that you face in using eyewear?
- Any suggestions to improve the shop/practice you visit for eye tests?

The structured questions used in this survey were face validated via a focus group approach that consisted of

eyewear users and optometrists. Each interview was either audio or video recorded in exact words used by respondents and later transcribed. The Statistical Package for Social Sciences (SPSS) software version 23.0 (SPSS Inc. Chicago, IL, USA) was used for data entry and descriptive analysis.

Results:

Demographic data

The findings reported in this paper were derived from an interview study conducted with a sample of 408 respondents from 12 states and three federal territories in Malaysia. The age range was from 13 to 70 years old (median/mode = 23 years old). The distribution of ethnicity is presented in Figure 1. Gender distribution was 47% (192) males and 53% (216) females. The residential areas of respondents are illustrated in Figure 2. The respondents' background was diverse consisting of more than 40 different types of occupations.

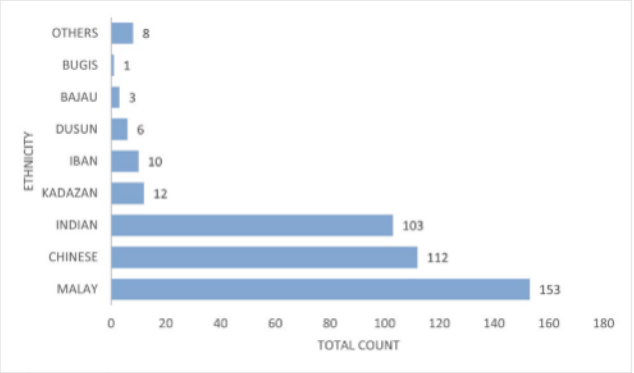

Figure 1: The ethnicity composition of 408 respondents

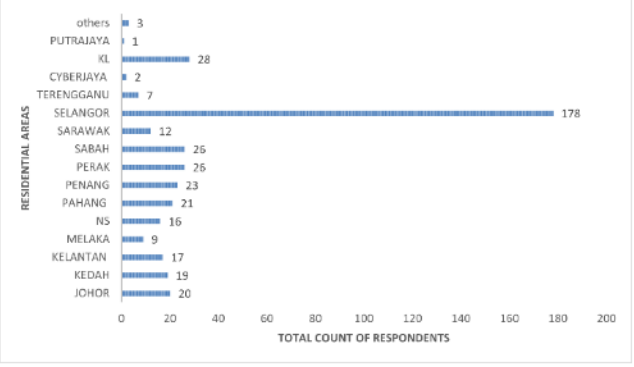

Figure 2: The residential areas of the respondents

First eye test experience

The first eye test experience is presented in Figure 3. 'Positive' indicated a pleasant experience of eye examination, while 'negative' indicated an unpleasant experience of eye examination. 'Neutral' feeling denoted an uneventful experience, neither positive nor negative. 'Mixed' experience indicated a combination of pleasant and unpleasant involvement during the eye test. We found that the distribution was relatively equal (27% for positive, neutral, and mixed categories). The negative feeling was slightly lower (19%).

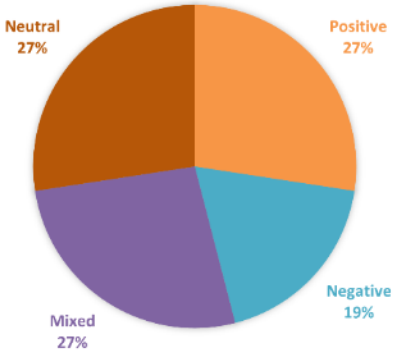

Figure 3: First Eye Test Experience

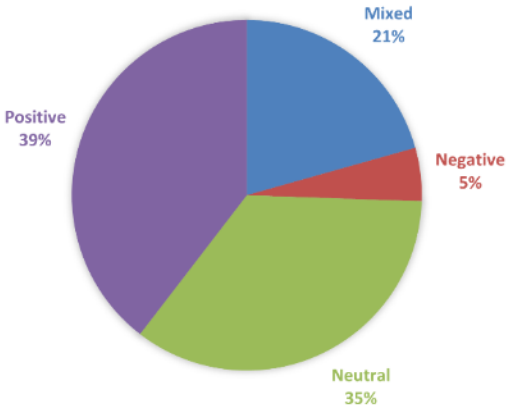

Figure 4: Overall Eye Test Experience

Overall eye test experience

The overall eye test experience showed different distribution patterns of pleasant and unpleasant feelings (Figure 4). As high as 39% narrated positive feelings, followed by 35% of respondents who tended to express neutral experiences. As low as 5% vented negative experiences. Approximately 21% described mixed positive and negative feelings in their overall eye test experience. A summary of the remarks on five commonly reported elements of eye test experience is given in Figure 5. Generally, respondents commented on the interaction skills of the eye care practitioners (friendliness and clarity of instructions), subjective refractive refraction procedures (clarity and difficulty to follow instructions), visual acuity testing (anxiety in fear of giving the wrong answers that might lead to inaccuracies of measurement), frame selection

(uncertainties of suitability as well as concerns on an affordable price range), autorefractive (fast and convenient).

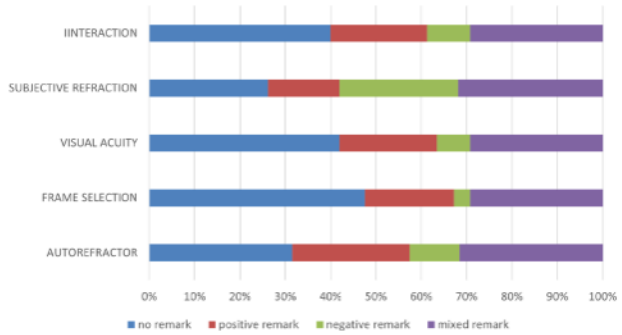

Figure 5: Remarks on five commonly reported elements of eye test experience

Information on eye care practitioners

When posted with a question on the background and qualification of the eye tester, nearly half (49%) of respondents did not know who tested their eyes (Figure 6). It is interesting to find that the majority of the respondents were tested by optometrists (34%). Opticians and ophthalmologists were involved in a small percentage of eye tests among the respondents, 9% and 8%, respectively.

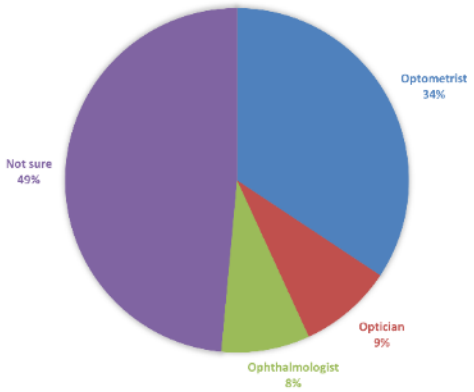

Figure 6: Information on the awareness of the clients about the qualification of the eye care practitioners

The Role of Vision on the Quality of Life

The perception of the role of vision on the quality of life is summarised in Figure 7. The majority believed that vision could affect their quality of life (71%). Surprisingly, about 22% of respondents did not think that vision could affect their quality of life. About 6% gave mixed remarks. Approximately 79.41% described their leisure activities were affected by vision. Approximately 63.24% testified their study was influenced by vision. Near half (50.74%) informed their work was affected by vision.

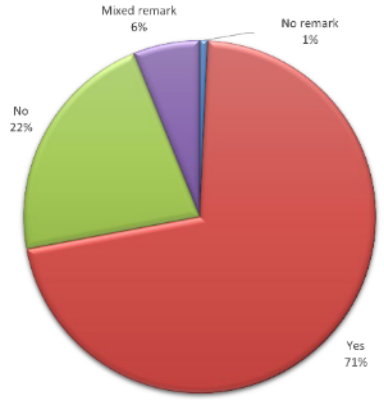

Figure 7: Clients' perception of the impact of vision on the quality of life

Eyewear experience

The five most frequent complaints about eyewear were physical limitation, inconvenience, sensation problems, visual adaptation challenges and cost (Figure 8). The physical limitation of spectacle included frame-induced restriction of visual space—the slippery of the frame during sports activities. The inconvenience included misplacement of spectacles, frequent replacement, forgetting to bring them when needed. Sensation discomfort is described by the pressure near the face surface in contact with the nose pad and areas in contact with temples that sit on the ear. Visual adaptation challenges included adaptation to prescribed power. The cost issue is due to regular replacement due to power changes or damage to existing eyewear.

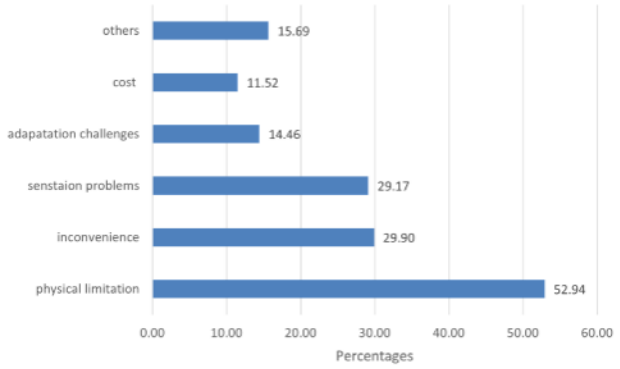

Figure 8: Main scopes of complaints about eyewear

Scopes for improvement

Scopes of improvement included service (39.71%), instruction (22.55%), duration (14.22%), and total test (12.75%). The majority expected improvement in service with a more friendly approach and competence. Instruction should be given to clients instead of scientific jargon. Most respondents wished

to have a shorter duration and fewer tests of the full eye examination.

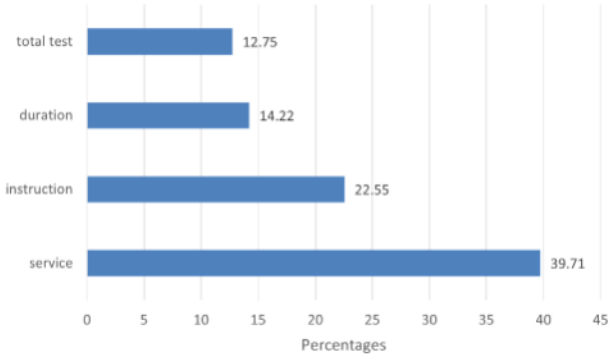

Figure 9: Scopes that required further improvement

Discussion:

The present survey was distributed across Malaysia except for Perlis, as can be seen by the percentage of the respondents from 12 states and three federal territories of Malaysia. They consisted of more than eight ethnicities in the Malaysian population.

Even though nearly three-quarters (74%) of the clients reported 'neutral' and 'positive' about the overall eye test experience, there was still room for improvement to rectify the remaining 26%. The first eye test experience could have been more enjoyable. Nearly half experienced unpleasant and mixed encounters (46%). Negative remarks predominantly overshadowed the positive remarks in subjective refraction procedures. Primary eye care practitioners could self-examine how to improve client satisfaction in this particular scope. In addition, interaction skills, autorefractor usage, visual acuity testing and frame selection were some of the common complaints of clients. However, the negative remarks were less than positive remarks in proportion. For example, five common complaints about eyewear experience were physical limitation, inconvenience, sensation problems, visual adaptation challenges and cost. Particular attention should be paid to frame and lens selection to resolve physical limitations, sensation problems and visual adaptation.

Previous studies reported that the eye care services provided by optometrists were not practising primary eye care according to the Ministry of Health Malaysia's Standard Operating Procedures due to the lack of equipment, the lack of time and upon patient request (Mohidin & Hashim, 2011; Abd Aziz et al., 2022). The time restriction can be related to the client flow in each practice. A proper scheduled appointment system may facilitate and provide a win-win solution. In addition, optometric eye examination fees should be imposed to sustain the business instead of practising free eye tests and relying on spectacle sales to break even or gain profit. Our findings supported the previous claim in the practitioner's survey about patient requests. Our respondents suggested reducing the testing duration and total tests during a comprehensive eye examination. There are two possibilities to look at this issue. The first is to re-examine the protocol of a complete eye examination to speed up the process or modify them into a more practical approach instead of doing all tests in a small, confined room. Have multiple small rooms for different sections of tests with short interval breaks for explanations before proceeding to subsequent tests. The second option is for the healthcare professionals to educate the Malaysian population about the importance of comprehensive eye examinations and the purpose of each test through social media and professional platforms. To counter the request by clients, better eye care awareness promotion should be given to the client regarding the importance of complete eye check-ups. When clients understand the significance of undergoing comprehensive eye examinations for preventive eye care or early intervention, they may better cope with the duration and a total number of tests with more tolerance. For instance, retinoscopy can help examiners to rule out pseudo myopia and to detect the 'scissor reflex' in keratoconus and cataract. Tonometry is essential in screening for glaucoma. Colour vision tests screen for colour deficiency that can affect learning, driving safety, occupational selection and quality of life (Tagarelli et al., 2004; Leske et al., 2020; Stevens et al., 2021). Eye health education about the importance of vision in enhancing the quality of life should be easy to penetrate public awareness because we found that approximately three-quarters of clients were aware that vision could affect their quality of life in our study.

In addition, nearly half of the clients (49%) were unsure who tested their eyes. Therefore, health education on the eye care ecosystem and the discrepancy of job scopes should be promoted as a part of the service. Co-management between optometrists and ophthalmologists should be encouraged to increase the effectiveness of the eye care ecosystem in Malaysia (Hussin et al., 2018; Abd Aziz et al., 2022).

Conclusion:

The survey on eye examination and eyewear experience from the client's perspective prompts more thoughts in strategising and optimising the optometric services in Malaysia. Instead of merely

focusing on what we optometrists can do, we must know what the client wants. A special task force should be formed to find a win-win solution or middle ground to enhance optometry services. Eye health education and promotion should be highlighted to the public about the role of optometric services, which include a comprehensive eye check-up and ocular disease screening. This survey will help eye care practitioners understand the client experience and the need to improve the eyecare services. Future research can collect data from eye care practitioners and clients simultaneously to derive a better strategy by mapping and realigning expectations more precisely.

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Review Articles

A Comparative Study on The Effectiveness of Soft Tissue Work and Transcutaneous Electrical Nerve Stimulation: In Patients with Non-Specific Lower Back Pain

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Abstract:

In Pakistan, one of the primary causes of the reduced functional activities output at work is the lower back pain (LBP) which are in general non-specific. In physiotherapy clinical practice multiple treatments for non-specific lower back pain (NSLBP) are available including soft tissue work (STW), transcutaneous electrical nerve stimulation (TENS), exercise and heat therapy. This study focused to compare the effectiveness of STW and TENS in patients suffering from NSLBP. A RCT with two-groups pre & post-test was conducted at Physiotherapy OPD, JPMC, Karachi. A total of 40 NSLBP patients in the 15 - 45 years of age were included through non-probability purposive sampling method. Baseline screening was performed Through systematic random sampling allocation of subjects were taken place into two groups. A-group received STW with standardized exercise protocol (SEP) while B group received TENS with SEP. Calculated data were entered into SPSS V-16.0. For categorical variables percentages and frequencies were computed. Results are expressed in mean and standard deviation. Each group was compared with the final measure after four weeks of data collection as pre and post by using paired t-test and independent t-test. Pain, tenderness and functional disability were assessed using Numeric pain rating scale (NPRS), Tenderness index (TI) and Oswestry Disability Index (ODI) respectively. Pre & post treatment scores were documented. A maximum rate of drop-out 20% was presumed. This study showed a significant decline at the end of treatment sessions in Pain scale, TI and ODI scores in both groups (A & B), although a more obvious reduction was observed in ODI of group-A in comparison to the group-B. It spotlights that STW along with SEP should be used in patients with NSLBP.

Keywords: Non-specific lower back pain, TENS, Soft Tissue Work

Introduction:

Back ache is one of the most prevalent musculoskeletal complaints and most of the people in their life-time experiencing pain in back (Walker, 2012). Occupational and work-related problems reported as the main cause of low back pain among many peoples (Allan, & Waddell, 1989 and Lis et al., 2006). About 75-84% of low back pain complaints were recorded in the general population and severe morbidity growing health care costs, sick leaves and individual endure as a result of low back pain (LBP) reported around 5-10% (Heliövaara, et al., 1989, Cassidy, 1988 and Dagenais, 2008). The term non-specific low back (NSLBP) pain is elucidated as pain in the back that is not linked with specific pathology. Anatomically the source is unfitted to link with NSLBP in about 80% people (McIntosh, & Hall, 2011). In primary care higher prevalence (85-90%) of NSLBP in patients is observed (Deyo, & Phillips, 1996). The NSLBP patients seen by physical therapists, help in the proper diagnosis (Wand, & O'Connell, 2008). Worldwide, more disability is observed due to back pain rather than any other condition (Rudy, et al., 2007). In developing countries years lived with disability (YLDs) about 59% of global burden in adults age 50-69 due to back pain reported in 1990, but by 2010 this proportion had increased to 67%. Moreover, it is ranked by Global Burden of Disease Study as the highest number of YLDs and sixth in terms of disability-adjusted life years (DALYs) (Brooks, 2006, Hoy, et al., 2014 and Woolf, & Pfleger, 2003). One of the studies reports that in LBP cases, over 90% are NSLBP (Mirza Baig, et al., 2018). In Pakistan, 19.5 % prevalence of LBP has been found and its third leading cause of YLDs (Buchbinder, et al., 2013). On the contrary, in other countries like China, Bangladesh, Iran, the United Kingdom and India prevalence of LBP has been reported as 34.1, 20.1, 14.8, 9.0 and 8.4% respectively (Hoy, et al., 2012). One of the surveys shows that Men and women are equally affected by LBP. Moreover, 50% of adults and 30% of adolescents at least once (Papageorgiou et al., 1995). Likewise, incidence of LBP among many young adults (18-50%) and children also raising (Diepenmaat, 2006). Karahan, et al., (2009) studied the frequency of back pain among hospital staff and found that 65.8% had suffered from back pain and about 61.3% within the previous 12 months. Additionally, the Bradford-Hill causation criteria in relation with systematic reviews from workers studies summarizing the independent contributing factors of low back pain were, improper occupational sitting (Langevin, & Sherman, 2007), postural instabilities, (Roffey, et al., 2010a), standing and walking (Roffey, et al., 2010b), inappropriate patients handling (Roffey, et al., (2010c) pulling or pushing, avoidance of ergonomically positioning during bending, twisting, lifting and carrying (Roffey, et al., 2010d, Wai, 2010a and Wai, 2010b). Among the various treatment options evidences to compare the effectiveness between STW and TENS in NSLBP has not been evaluated. Research from the past advocate that STW decreases pain threshold and improves activities of daily living (ADL) by applying the proper modalities that direct towards the muscle and fascia (Marzouk, 2012). The TENS is a therapeutic non-invasive modality mainly used for pain relief by electrically stimulating peripheral nerves via skin surface electrodes (APTA Anthology, 1993). Milne et al., in (2022) conducted a meta-analysis suggest that TENS does not have clinically important benefit on pain in patients with chronic LBP. Regardless of the evidence of efficacy of TENS in treating chronic LBP, it is a common modality for treating LBP due to higher demand for noninvasive, nonpharmacologic interventions. It is highly prescribed due to low cost and low occurrence of side effects (Williams, 2010). In addition to this, Paley et al., (2021) conducted a comprehensive review in which there were no examples of meta-analyses with 'sufficient data' regarding TENS demonstrating no benefit. Therefore, this study evaluates TENS to be considered or not as a treatment option.

Materials and Methods:

Location, Design and Duration:

This study was conducted at the outpatient department of Jinnah postgraduate medical center, Karachi, Pakistan. This was a self-controlled trial with two-groups in pre and post study design among patients of NSLBP was used. Those patients willing for participation were selected for this study after written informed consent. The total duration of this study was 6 months from March 3, 2019 to August 3,2019.

Inclusion and Exclusion criteria:

The patients included were 15-45 years old with a history of non-specific lower-back pain. Negative modified Schober's test. Negative SLR (Straight leg raise). Localized pain or either radiate up to gluteal folds. Those who were not fitting to the aforementioned criteria were excluded from the study i.e., patients age less than 15 and more than 45, having lower-back pain that radiate to the lower limbs and

having other complications like, cauda equina syndrome, malignancy, a pregnant woman with cardiac pacemaker were excluded from this study.

Sample Size:

The total patients consented for the study were 40 both genders including 30 male 10 female. They were randomly equally divided into two groups (A & B) through non-probability purposive sampling technique having 20 participants. The patients were precisely explained about the study.

Study Protocol:

The group A received soft tissue work (STW) including, Myofascial release (to and fro mobilizations or oscillations, alternate up and down stokes on either side). Three sets of 30 stokes/oscillations were applied at the rate of three oscillation per second. Localized stretching of erector spinae muscles. The generalized stretch of para-spinal muscles of low back simultaneously.

The group B received a program of electrotherapy using Trans electrical nerve stimulator (TENS) for 20 minutes on continuous mode in the prone lying position.

Additionally, both groups received the program of standardized exercise protocol (SEPs) as supportive treatment include: Stretching Ex: through alternate quadruped position, pelvic tilting, bridging, wall squatting with 10 cycles (repetitions).

Outcome Measurements:

Outcome were measured in all participants at the first and last treatment session by using Numeric pain rating scale (NPRS), which is a valid and reliable scale to measure the intensity of pain with higher reliability (Dailey et al., 2017).

The Tenderness Index (TI), which is ranging from 0 - 4 (no pain, patient (pt) winces, pt winces and withdraw, pt not allow the joint to touch) (Basford, 1987 and Childs, 2005).
Oswestry Disability Index (ODI), is a principle lower-back functional outcome tool and is considered as the Gold Standard (Childs, 2005, Jensen et al., 1993, Rodriguez, 2001 Ferraz, 1990 and Hawker, 2011). Each subject received a total of 12 treatments sessions (three sessions per/week) for four consecutive weeks.

The duration of each session given to group A (STW and SEPs) and group B (TENS and SEPs) was 30 minutes.

The Appendix 1 provides further detailed treatment procedure adopted in this study at the end of this manuscript.

Justification for the use of SEP

According to Ganong, (1978), the release of fascial tension is a more efficient biomechanical function. Moreover, muscles and bone both are structures that work dynamically in response to exercises therefore, all the participants were given SEP within joint range. Exercise training program help in restoring the loss of muscle mass due to disuse. Therefore, it is put forwarded that SEPs should be included as a crucial component of treatment and prophylaxis. Through SPSS-version 16.0 data were scrutinized, results are expressed in mean and standard deviation and are displaced graphically as well in tables. Following are some pictures with explanation of treatment procedures and protocols.

Statistical Analysis

The collected data on the various aspects was compiled key in into SPSS (Version 16.0). In this mainly descriptive statistics and paired t-test was performed. The differences in the mean were regarded significant at $P<0.05$ of confidence interval.

Results:

As mentioned earlier, that the total numbers of patients suffering from non-specific lower back pain (NSLBP) were 40. The means were analyzed for numeric pain rating scale"(NPRS) at pre and post-treatment. The "tenderness index"(TI) at pre and post-treatment and "oswestry disability index"(ODI), for pre and post-treatment of both groups (A &B). To compare the mean levels for pre and post treatment of NPRS, TI and ODI between Soft tissue work and TENS. The results are presented in the following section;

The Table 1 summarizes the data on patients various aspect i.e. numbers, percentages, age, gender and the numbers in the treatment groups (STW & TENS).

Table 1: Mean age by gender and groups of STW and TENS

Age (Years)	Numbers	Percent	Mean ± SD
15-20	3	7.5	3.63 ±1.275
21-25	5	12.5	
26-30	9	22.5	
31-35	10	25.0	
36-40	13	32.5	
Gender			
Male	30	75	
Female	10	25	
Group			
STW	20	50	
TENS	20	50	

The mean, standard deviation and comparisons of "Numeric Pain Rating Scores" of soft tissue work and TENS in patients at pre and post level of treatment shows that there was significant (P<0.001) difference in the NPRS score of soft tissue work and TENS after treatment. The pre and post treatment is shown in the Table 2.

Table 2: Comparisons of "Numeric Pain Rating Scores" of soft tissue work and TENS in patients at pre and post level of treatment

	Pre	**Post**	**p-value**
	Mean ± SD	**Mean ± SD**	
STW Patients (n=20)	4.40 **±** 1.635	0.80 **±** 1.152	P<0.001
TENS Patients (n=20)	4.40 **±** 1.314	0.90 **±** 0.968	P<0.001
*p<0.05 was considered significant using Paired Sample t-test			

The data on the mean & standard deviation comparisons of "Tenderness Index" of soft tissue work and TENS in patients shows that there was significant (P<0.05) effect as well at pre and post level of treatment. The results shows that there was significant (P<0.05) difference in the TI score of soft tissue work and TENS after treatment with as shown in the Table 3.

Table 3: Comparisons of "Tenderness Index" of soft tissue work and TENS in patients at pre and post level of treatment.

Tenderness Index (TI)	**Pre**	**Post**	**p-value**
	Mean ± SD	**Mean ± SD**	
STW Patients (n=20)	1.30 ± 0.733	0.20 ± 0.523	P<0.001
TENS Patients (n=20)	1.15 ± 0.589	0.25 ± 0.444	P<0.001
*p<0.05 was considered significant using Paired Sample t-test			

The data on comparisons reveals some interesting effects of the STW modality on the "Oswestry Disability Index" of soft tissue work in patients at pre and post level of treatment. This modality shows that ODI value of soft tissue work greatly improved after treatment being the effect was highly significant (P<0.001) as shown in the Figure 1.

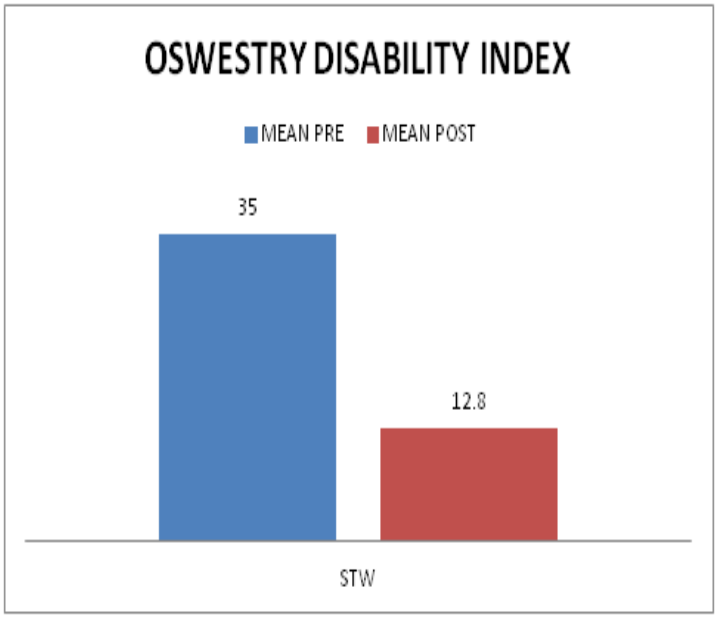

Figure 1: Comparisons of "Oswestry Disability Index" of soft tissue work in patients at pre and post level of treatment

Similarly, the effect TENS modality followed the same trend of effect on ODI in patients at pre and post level of treatment. This modality shows that ODI value greatly improved after treatment. There were significant (P<0.001) differences in the pre and post period as shown in the Figure 2.

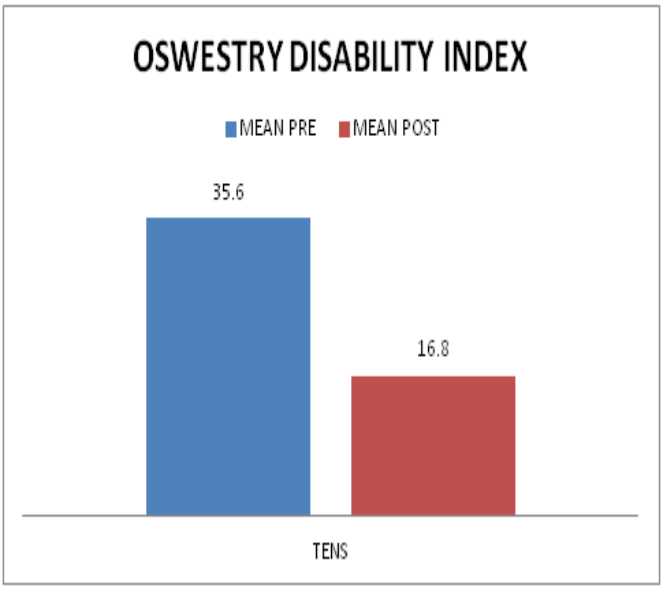

Figure 2: Comparisons of "Oswestry Disability Index"(ODI) with TENS in patients at pre and post level of treatment

Looking at the mean comparisons of NPRS, TI and ODI scores between the two modalities (STW & TENS) all the three parameters' values significantly (P<0.001) equally improved for both groups. Therefore, was no difference between STW and TENS on the NPRS and TI scores of patients (Table 4).

Table 4: Comparisons of TW and TENS on the NPRS, TI and ODI scores

Post-Treatment	STW Mean ± SD	TENS Mean ± SD	p-value
NPRS	0.80 ± 1.151	0.90 ± 0.968	0.721
TI	0.20 ± 0.523	0.25 ± 0.444	0.729
ODI	12.80 ± 7.606	16.80 ± 12.007	0.078
*p<0.05 considered significant using independent sample t-test			

Discussion:

In this study, it was observed that either STW or TENS are effective in treating patients with non-specific lower back pain. In this study, significant dropping was observed in the intensity of pain, tenderness and disability at the end of treatment sessions, but the decline in ODI was more marked in participants receiving STW in comparison with TENS. Remarkable difference in pain intensity and functional disability were observed in data collection after 4 weeks. Additionally, NPRS, TI and ODI were having significant differences in pre and post treatment scores for group A & B were noticed. In comparison with this study, Nesrin Yağcı conducted a study on 122 participants on the effects of soft tissue mobilization on pain, disability level in patients with chronic low-back pain (CLBP). A significant difference between pain intensity and disability level (p<0.005) was observed. Soft tissue techniques in manual therapy applications are described in the text of muscle energy technique, trigger point relaxation, myofascial relaxation and post isometric relaxation technique Nesrin et al., 2020). Ziyan Chen et al in 2021 conducted a meta-analysis which showed that myofascial release (MFR) has a significant effect on reducing back disability in patient with back pain (Ziyan et al., 2021). Core stability has reached a wide spread in recent years, considering that several studies have observed in CLBP. The purpose of core stability exercises is to recreate normal muscle function in order to increase spinal stability, neuromuscular control within the lumbopelvic region, induce inter-segmental stiffness and prevent shear force that causes injury to the lumbar spine (Frizziero, et al., 2021). In a study of Cleland et al., (2006) explained that SEP for managing NSLBP should include pelvic tilting, bridging, wall squats and quadruped alternate arm and legs activities in patients were asked to perform 3 sets of 10 repetitions of each exercise within pain free range that result in clinically meaningful improvement in dysfunctions (Cleland, et al., 2006). Although the current study findings of pain reduction with application of STW, are congruous with the study finding of Antony Leo Aseer. P et al, signified lessen pain in CLBP through STW (Antony Leo Aseer, & Iyer, 2013). Wu zugui et al conducted a systemic review and meta-analysis in 2021. Improvement in pain and physical function were observed for CLBP after receiving myofascial release. Pain (SMD=0.37, 95% CI (-0.67, -0.08), I^2 =46%, P=0.01 and physical function as (SMD=0.43, 95% CI (-0.75, -0.12), I^2 =44%, P=0.007. On the contrary, the present study findings and undoubtedly evidence related to the effectiveness of STW along with exercise were found (Wu, et al., 2021). Jauregui, (2016) conducted a meta-analysis of TENS for CLBP. Demonstrated noticeable pain reduction. The standardized mean difference in pain from pre-post treatment for TENS was 0.844 which is much similar to current study in which mean difference in pain from pre-post treatment for TENS reduced from4.4000 to 0.9000. In addition to this, Thiesis with fellows, conducted a 12 weeks double blinded RCT on electrical stimulation for CLBP. In that they assessing the therapeutic effectiveness of TENS in NSCLP which relatively small as compare to other modalities (Thiese, et al., 2021). This study affirms significant effects of STW than TENS along with SEP in NSLBP. In contrast, both the treatments had prominent effects in generating remarkable improvement in pain intensity and disability. In LBP

wide range of cases are NSLBP, which is a paramount health issue which socially augment the burden of disease. Therapeutic procedures that are economical and safe like STW and TENS combined with exercise (SEP) possibly will show substantial value.

Limitations of the Study

This study was unable to address the long-term benefits of STW and TENS because the duration since the duration of the treatment is short around 4 weeks for the non-specific lower back pain (NSLBP) management.

Conclusion:

In summing up, the current study reveals that physical therapy interventions such as STW and TENS have remarkable results in dropping pain intensity and ameliorating disability in NSLBP patients. It is suggested that STW along with SEP should be used in the patients with NSLBP.

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Appendix 1 Detailed Treatment Procedure and Protocol

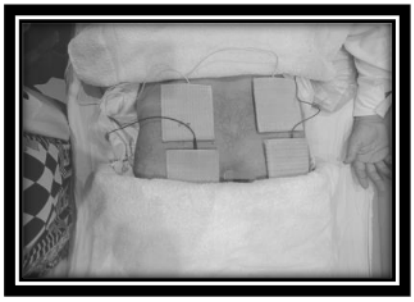

Figure 1A. Application of TENS in patient

The patient lay down on treatment table in a prone position comfortably. Then TENS electrodes were accustomed to its mode of treatment was set for duration, intensity according to the patient bearing threshold. The treatment mode continuous, with 20 minutes on alternate days for four weeks

Figure 1B. Soft tissue work treatment-1 (Myofascial release)

The patient lay down on treatment table in a prone position comfortably. Therapist apply analgesic for pain relief and to get skin smoother to apply the soft tissue mobilization. In this figure therapist firmly grasp the patient lower back soft tissues and start giving mobilization in to and fro

Figure 1C. Soft tissue work treatment-2 (Myofascial release)

In this figure therapist firmly grasp the patient lower back soft tissues and start giving mobilization in rotational or alternate upward and downward direction

Figure 1D. Soft tissue work treatment-3 (Friction).

The therapist applying small localized stretching on the sideways of spinal bony prominences

Figure 1E. Soft tissue work treatment-4 (Stretching).

The therapist firmly gives generalized stretch in epsilateral side of lower back

Figure 1F. Soft tissue work treatment-5 (Stretching).

The therapist firmly gives generalized stretch in both sides of lower back

Figure 1G. Standardized Exercise protocols (SEPs) (Quadruped Position-1)

In this figure, the patient was taught to perform alternate arm and leg raise in

Figure 1H. (Quadruped Position-2).

In this figure, the patient was taught to perform pelvic tilting while tighten the muscles of stomach and hip. Straighten the back and press the floor. Bend the

Figure 1I. Pelvic Tilting.

In this figure, the patient was taught to perform trunk stability exercise (bridging). Patient lie down and bend the knee. keep the soles of the feet flat on the

a quadruped position. Firstly, start with no hold but after few sessions as pain threshold decrease start holding with counting of 5 - 10

Figure 1J. Bridging

In this figure, the patient was taught to perform wall squats. The patient stands and back supported with the wall. The patient is guided to bend his/her knee while keeping the back straight and supported with the wall. Whereas, keep the soles of feet in complete contact with the ground. Firstly, start with no hold but after few sessions as pain threshold decrease start holding with counting of 5 -10

legs at the knees and keep soles of the feet touching the floor. Firstly, start with no hold but after few sessions as pain threshold decrease start holding with counting of 5 than 10

Figure 1K. Wall Squatting. 10.

In this figure, the patient was taught to perform wall squats. The patient stands and back supported with the wall. The patient is guided to bend his/her knee while keeping the back straight and supported with the wall. Whereas, keep the soles of feet in complete contact with the ground. Firstly, start with no hold but after few sessions as pain threshold decrease start holding with counting of 5 than 10.

ground. slowly try to lift the body low back and keeping the both hands on the side touching the ground. Firstly, start with no hold but after few sessions as pain threshold decrease start holding with counting of 5 than 10

The association between flat feet and body mass index in the adult population: A systematic review

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Abstract:

Background: Flat foot is one of the foot disorders that is usually neglected which may seriously affect the quality of life in a longer term. Among the etiological factors, one of those is the higher body mass index (BMI). While flat foot incidence is common, its relationship with body mass index remains equivocal. **Aim**: This systematic review investigated the association between flat feet and body mass index in the adult population. **Methods:** A systematic search of three electronic databases was conducted. Studies on human adults (>18 years) with flat feet and gold standard outcome measures were included. This review was conducted and reported following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. The Appraisal tool for Cros-Sectional Studies (AXIS) was utilised to assess the methodological quality. All articles had good score of methodological quality. **Results:** Out of the 720 articles that were screened, only eight studies met the inclusion criteria and were included in this systematic review. From these eight articles, seven studies reported a significant relationship between flat feet and body mass index in the adult population. **Conclusion:** There is a significant association between flat feet and body mass index among the adult population. Therefore, as the BMI increases, the chances of developing flat foot increases.

Keywords: Flat feet; Pes Planus; Body mass index; Association; Relationship

Introduction:

Adult population is susceptible to various musculoskeletal disorders as they age, one of the disorders being flat foot. Flat foot is a commonly observed foot disorder in clinical practice yet neglected. American College of Foot and Ankle Surgeons (ACFAS, n.d.) described flat foot as foot deformity with varying degrees of physical impact and characterized by no arch when weight-bearing. Flat feet have also been described (Pourghasem et al. 2016) as fallen arches where the inner side of the foot is flattened, allowing the entire foot to touch the ground. Flat foot can be classified as rigid or flexible. In case of flexible flat feet medial longitudinal arch (MLA) persists during non-weight bearing and disappears with weight-bearing and this contrasts with rigid flat feet whereby the MLA is absent in both the conditions, i.e... weight-bearing and off-load (Pourghasem et al., 2016).

The causative factors can be obesity, poor footwear in early childhood, injury, overdue stress on the foot, laxity of muscles and ligaments, and faulty biomechanics. The prevalence of flat foot is higher in females, individuals with excessive BMI, and those with bigger feet (Arachchige et al. 2019). Hence obesity has been indicated as a factor that can lead to

flat foot. Flat foot may increase the incidence of lower extremity injuries due to alteration of foot kinetics or poor balance due to abnormal foot structures such as excessive pronation of foot (Arachchige et al., 2019). Flat foot is common in children due to physiological concern of incomplete process of developing medial arch and excessive fat deposition under foot. However, most flat foot cases among children will disappear with age (Suciatiet al., 2019).

According to World Health Organisation body mass index is a widely used indicator for classifying the people according to their body weight and height (WHO, 2023). World health organisation classifies the BMI into categories from underweight, normal weight, overweight and obesity (WHO, 2023).

The World Health Organization reported that in 2016, 1.9 billion people aged above 17 were overweight adults and among them, over 650 million were reportedly obese (WHO, 2020). According to them, the prevalence of obesity globally tripled from 1975 to 2016 which illustrated that there was a significant increase in the obese population. In Malaysia during National Health and Morbidity Survey 2019, it was found that 1 out of 2 Malaysian adults were either overweight or obese as reported by National Institutes of Health (NIH, 2020).

Keeping all the mentioned factors in mind, obesity seems to be one of the important causative factors for flat foot. Due to higher prevalence of obesity in the world it is present among most obese individuals. Therefore, the general population needs awareness regarding the effect of obesity on posture. Therefore, this review was intended to know the association between BMI and flat foot in the available published literature.

Methodology:

Identification

This study used the preferred Reporting items for Systematic reviews and Meta-analyses (PRISMA) guidelines to aid in reporting the findings. Three different databases were used to retrieve the articles which included the PubMed, Science Direct, and SCOPUS databases. The Boolean operators 'AND' and 'OR' was used during the searching process. Following combination of words were used: "flat feet" AND "body mass index OR excessive body weight", "association between body mass index" AND "pes planus OR flat feet".

Screening and Eligibility

All the articles were screened for any duplication of articles by using *Mendeley* and removed all the redundancy within the papers. The articles were also screened based on the inclusion and exclusion criteria as presented in Table 1 The selected articles were further reviewed for their eligibility based on PICOS (Population, Intervention, Control, Outcome, Study type) Table 2.

Table 1: The Criteria for Inclusion and Exclusion

Inclusion criteria	Exclusion criteria
• English publications • Articles must be published • Articles published within 10 years • Full-text articles available • BMI parameter following WHO guideline	• Articles that need access to it • Magazines, e-books, and trade journals

Table 2: Detailed PICOS criteria

Criteria	Descriptions
Population	Individuals age ≥18 years old checked for flat feet disorder
Intervention	-
Comparison	Different groups of body mass index
Outcomes	Footprint Analysis, Footprint Indices, Static foot measure
Study type	Cross-sectional

Results:

Study selection

The selection process is simplified in the PRISMA flow diagram in Figure1. A total of 715 articles were sought from databases namely, Science Direct, Scopus, and PubMed. In this process of identification 591 references were identified from Science Direct, 85 references from Scopus, and 39 references from PubMed. In addition to these databases, five additional references from google scholars were also sought making a total of 720 references.564 duplicates were detected and removed leaving 156 articles were screened for the titles and abstract. Out of 156 articles, 104 were excluded based on the exclusion criteria and 44 of the articles were removed as they were not fulfilling the PICOS model set by the present study, leaving 8 studies to be reviewed.

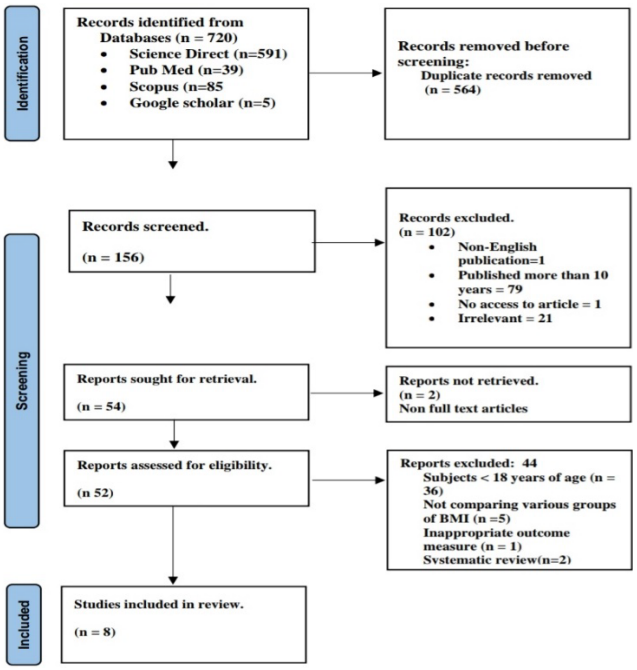

Figure 1: The Processes of Identification, Screening, Eligibility and Included by using PRISMA Guideline.

Description of Included studies

From the eight included studies, the number of subjects involved in the studies was ranged from 71 to 533 and the ages were ranged from 18 to 84 years old. The studies were conducted in various countries, Poland, India, Pakistan, Brazil, and Saudi Arabia. The study conducted by Jankowicz-Szymańska, (2018) included only female participants from various age groups meanwhile other studies recruited participants from both genders. All the subjects recruited in the studies were healthy individuals. The statistical analysis reported on the association between flat feet and body mass index in all the studies.

The results obtained were described in a table form in Table 4, adopted from Systematic Review Guidelines by The American Occupation Therapy Association, updated in March 2020 (American occupational therapy association, 2020).

Methodological quality

All included studies were assessed for methodological quality by Appraisal Tool for Cross-Sectional Studies (AXIS) (Downes et al., 2016). All studies were rated as per the instruction manual of AXIS, which has the highest score of 20. The score of all the articles included is summarised in the Table 3.

Studies done by (Jankowicz , et al 2018), (Chougala., et al 2015) , (Aurichio.,et al 2011), and (Arithi., et al 2018) scored 15 or more than 15 out of 20. Other studies reported less than 15 scoring based on the Appraisal Tool for Cros-Sectional studies.

Table 3: The Methodological Quality of the Included Studies using the Appraisal tool for Cross-sectional study (AXIS)

Item	Study							
	Jankowicz-Szymańska et al. (2018)	Ahmed, and Saleem (2019)	Chougala et al. (2015)	Aurichio et al. (2011)	Vijayakumar et al. (2016)	Arthi et al. (2018)	Przysada et al. (2013)	Almaawi et al. (2019)
1	Y	Y	Y	Y	Y	Y	Y	Y
2	Y	Y	Y	Y	Y	Y	Y	Y
3	Y	Y	Y	Y	Y	Y	Y	Y
4	Y	Y	Y	Y	Y	Y	Y	Y
5	Y	Y	Y	Y	Y	Y	Y	Y
6	Y	Y	Y	Y	Y	Y	Y	Y
7	NR							
8	Y	Y	Y	Y	Y	Y	Y	Y
9	Y	Y	Y	Y	Y	Y	Y	Y
10	Y	Y	Y	Y	N	Y	Y	Y
11	Y	N	Y	Y	Y	Y	N	Y
12	Y	Y	Y	Y	Y	Y	Y	Y
13	NR							
14								
15	Y	Y	Y	Y	Y	Y	Y	Y
16	Y	N	Y	Y	Y	Y	Y	Y
17	Y	Y	Y	Y	Y	Y	Y	Y
18	N	N	N	N	N	Y	N	N
19	NR	N	N	N	NR	N	NR	N
20	Y	NR	Y	Y	Y	Y	NR	NR
Total (/20)	**15**	**12**	**15**	**15**	**14**	**16**	**13**	**14**

Note. Y = Yes; N = No; NR = Not Reported

Discussion:

This systematic review was formulated or synthesized from eight studies of cross-sectional study design.

Jankowicz., et al (2018) reported a significant ($p<0.05$) difference of arch index of both feet between normal and overweight individuals in a cross-sectional study of 270 females, with Methodological quality score of 15 out of 20. Ahmed., et al (2019) reported a positive association($p<0.001$) between body mass index and level of arch using navicular drop test among 71 individuals including both males and females with

methodological quality score of 12. Chougala., et al (2015) reported a significant ($p<0.001$) relation between body mass index and flat foot using arch index as an outcome measure in 228 individuals including both males and females with methodological quality score of 15 out of 20. Aurichio., et al (2011) reported a significant ($p<0.001$) correlation between body mass index and arch index among 399 individuals including both males and females with methodological quality score of 15 out of 20. Vijayakumar., et al (2016) reported a strong relationship ($p\leq0.05$) between body mass index and flat foot among 412 individuals including both males and females with methodological quality score of 14 out of 20. Arithi., et al (2018) reported no significant difference ($p= 0.16$) between body mass index and types of foot arches, using staheli index as an outcome measure among 250 individuals including both males and females with methodological quality score of 16 out of 20. Przysada., et al (2013) reported a significant association between flat foot and body mass index($p<0.001$) among 108 individuals including both males and females with methodological quality score of 13 out of 20. Amaawi., et al (2019) reported a significant correlation between body mass index and flat foot($P<0.05$) among 533 individuals including both males and females with methodological quality score of 14 out of 20.

Association between flat feet and body mass index

According to the study by Jankowicz-Szymanska et al. (2018) the fallen longitudinal arch in one or both feet were found to be 45% from the group of overweight and obese and 10% from the normal BMI group based on the arch index (AI) value.

There was a significant association ($p=0.001$) found between the BMI and flat feet by (Chougala et al., 2015). This is in line with the result from Ahmad and Saleem (2019) who found that there was an association between BMI and the level of the arch.

Aurichio et al. (2011), stated that there was a positive association between BMI and AI value in women. Whereas in men, there was a low positive correlation between BMI and AI value. The result was upheld by the fact that women have moderate association is due to greater ligament laxity and lower muscle strength compared to men (Aurichio et al., 2011). Regardless of that, both genders still showed a positive correlation between BMI and AI value. As a result of prolonged stress onto the foot following a high body mass index, it might be responsible for the changes in the structure of the longitudinal arch.

Vijayakumar et al. (2016) investigated the relationship between flat feet and BMI by using four footprint parameters. The result of their study presented that there is a strong relationship between BMI and flat feet. The prevalence of flat foot increases as BMI increases. This can be proven from their results which showed that the prevalence of flat foot is the highest in the morbidly obese group. Similarly, with the previous study, Almaawi et al., (2019) also reported similar findings with use of different outcome tools. Another study (Przysada et al., 2013) also agreed that there was a significant association between foot defects, mainly flat foot and BMI. The prevalence of flat feet was 37% and of these, 34.5% came from the overweight group.

Based on the results of the studies done by Jankowicz., et al(2018), Ahmed., et al(2019), Chougala.,et al(2015), Aurichio., et al(2011), Vijaykumar., et al(1016), Przysada ., et al(2013), and Almaawi., et al(2019) it is reasonable to state that higher BMI does lead to flat feet incidence. Anatomically, the line of gravity of the human body passes downwards and falls between the heel and metatarsal heads through the cuboid-calcaneal junction (Schafer, 1987). Since the line of gravity passing through cubido-calcaneal junction, the medial longitudinal arch is always in continuous tension in weight bearing position (Akambase., et al. 2019). This continuous tension causes the surrounding structures such as ligaments to stretch and lose its elasticity forcing the arch to lower down as an adaptation to support the extra weight. Since anatomical literature already explains the elastic nature of the medial longitudinal arch, the association between obesity and the flat foot seems logical. Meanwhile the amount of drop in the medial longitudinal arch with increased body weight needs to be studied in future studies.

Moreover, people with excessive body weight have biomechanical deviations and adjustments happening in the lower extremities. People with flat feet tend to have a pronated foot which causes an internal rotation component in the entire lower extremity thus these people will develop a compensatory anterior pelvic tilt, which predisposes the person to many other musculoskeletal disorders like back pain, sacroiliitis, etc. (Son, 2016). Avery similar finding reported by Damien B Irving., et al. (2007), who concluded that obesity and pronated foot posture are associated with chronic plantar heel pain. Hence, it is inevitable to include the possibility of increased BMI contributes to the occurrence of flat feet.