

### Social Phobia Among University Students in Jordan

<sup>1</sup>Radwan Bani Mustafa, <sup>2</sup>Ayman M. Hamdan-Mansour, <sup>3</sup>Jameel Khaleel Hijazeen, <sup>4</sup>Hossam Saher Abed, <sup>5</sup>Fadi Walid Abdallah, <sup>6</sup>Hibatullah Mohammad Abu El Haija, <sup>7</sup>Hanan Omari

<sup>1</sup>Internal Medicine Department Faculty of Medicine, The University of Jordan

<sup>2</sup>Department of Community Health Nursing, Al-Farabi College, Riyadh, 11514, Saudi Arabia, Faculty of Nursing, The University of Jordan

<sup>3,4,5</sup>Intern, Ministry of Health, Jordan

<sup>6</sup>Faculty of Medicine, University of Jordan

<sup>7</sup>German Society for International Cooperation (GIZ)

Amman, Jordan. Tel: 00962-795485536; Email: radwanb9@gamil.com

**Abstract:** Social phobia is one of the most common anxiety disorders that may disable individuals if not treated. The purpose of this study was to investigate the prevalence of social phobia among university students in Jordan, and to examine its relationship demographic and personal characteristics. This is a descriptive correlational study. A convenience sample of 1659 university students enrolled in two private and two governmental universities in Jordan filled and returned a self-administered questionnaire. Data collected in regards to social phobia and its associated features. The analysis of data revealed that 220(13.3%) had history of childhood abuse, 825(49.8) had stressful life event over the last year, 120(7.3%) current alcohol users. the majority of university students had no symptoms at all (72.1%, n = 1196), while mild symptoms found among 18.9% (n = 313), and those with severe to very severe represented 2.3% (n = 38). Using 19 as the adult cutoff score for social phobia, 30.6% (n = 508) of the students are considered suffering from social phobia. There was no difference between in the total SPIN value among male and female students, however male students avoided performance in social situation more than female students (M=6.9 compared to M= 6.3). Social phobia was prevalent among university students in Jordan. Age, gender and substance use are factors that contribute to high level of social phobia. Mental health professionals need to enhance u psychological wellbeing of university- aged individuals.

[Radwan Bani Mustafa, Ayman M. Hamdan-Mansour, Jameel Khaleel Hijazeen, Hossam Saher Abed, Fadi Walid Abdallah, Hibatullah Mohammad Abu El Haija, Hanan Omari. **Social Phobia among university students in Jordan.** *Life Sci J* 2014;11(2):93-98]. (ISSN:1097-8135). <http://www.lifesciencesite.com>. 13

**Keywords:** Social Phobia, University Students, Jordan

#### Introduction

Social phobia that is also called social anxiety disorder (SAD) is the most common anxiety form of disorder that is characterized by intense fear in one or more social situations (Kessler et al., 2005). Social phobia is characterized by fear of negative evaluation. Sufferers have persistent fear and anxiety of being in one or more situations where the person feels under scrutiny by others and fear of acting in an embarrassing or humiliating way (Alegria et al., 2010; Katzelnick et al., 2001). Previous reports showed that students with social anxiety have problems in their education, low academic performance and lack of concentration due to avoidance of social interaction with colleagues and tutors in the academic setting (Clark & Wells, 2001; Rad et al., 2013; Rehman et al., 2011). According to literature, social phobia is one of the most common anxiety disorders with lifetime prevalence ranging between 2% and 16% in the community and an annual prevalence of 3 - 4% (Kessler et al, 2005; Ahmad et al., 2014). The use of different diagnostic criteria is just one of several factors which account for this variability in prevalence estimation (Baptista et al., 2012; Selamat

et al., 2010). The increasing interest worldwide in anxiety disorders in general and social phobia in specific related to their common occurrence in the community and due to the disability caused in individuals (Katzelnick, 2001). With earlier onset of anxiety the burden is expected to be worse (Tillfors & Furmark, 2007). Previous studies showed that social phobia has significant impact on functioning specially education and employment and leads to lower achievement and lower income (Verger et al., 2010).

The development of social phobia is usually occurs in early adolescence or young adulthood. During this phase of development, it is expected that individuals increase their self-consciousness, however; if social phobia developed individuals learning and social interactions with be affected negatively (Katzelnick et al., 2001; Harouni et al., 2014). This will results in occupational and interpersonal difficulties and reduced quality of life (13). In epidemiological studies, social phobia affected women more than men, and that social phobia is associated with depression, other anxiety disorders and substance use disorder.

There is paucity of information about the epidemiology of social phobia in the developing countries in particular among the young population. A comparative study in three Arab countries showed that social phobia among high school students ranged from 7.8% in United Arab Emirates to 13% in Egypt (Al-Hinai et al., 2006; Saba et al., 2010; Joudaki et al., 2014). While in neighboring countries social phobia reported among 21% of university students, and that social phobia has negative impact on identity formation and quality of life (Van Ameringen, Mancini, & Farvolden, 2003). Moreover, meta-analysis studies indicated that people with social phobia have poor quality of life and impaired psychosocial functioning (Alqahtani and Saba, 2013). However, early recognition and intervention will lessen negative consequences of social phobia in the sufferers (Keller, 2006). In addition, culture plays a significant role in enhancing negative consequences of social phobia. For example, society's attitude towards shyness and avoidance will affect the individuals' ability to form relationship, employment and education (Sulong et al., 2010; Saba et al., 2012). Problems in developing social phobia may contribute to lack of confidence to interact socially and gain positive reactions and acceptance from others (Olanjuji, 2007; Elarbi-Boudihir et al., 2011).

Although social phobia has been an interesting topic for researchers in the field, however and in Jordan, this topic has been ignored. Topic in the Jordanian Literature Has focused on anger, hostility, stress and psychological factors (Hamdan-Mansour et al., 2012; Hamdan-Mansour, Halabi, & Dawani, 2009; Shafry et al., 2012), while social phobia among university student has not been investigated. To our knowledge, this is the first study that addresses this issue. Therefore, *the purpose* of this study was to investigate the prevalence of social phobia among university students in Jordan, and to examine its relationship demographic and personal characteristics.

The research questions were:

1. What is the prevalence of social phobia among university students in Jordan?
2. What are the differences in social phobia related to select to demographic and personal characteristics among university students in Jordan?

#### **Methodology:**

**Design:** This is a cross-sectional descriptive correlation study that aimed at exploring the prevalence of social phobia among university students in Jordan. Data collected using self reported questionnaire from university student in private and governmental university.

**Sample and setting:** 1659 university students filled and returned a battery of two self-reported questionnaires. The students represented two governmental and two private universities selected

randomly among all universities in Jordan. In Jordan, there are 10 governmental universities and 14 private universities. Most of these universities are allocated in urban areas and students are coming from different geographical and socio-economic classes. Inclusion criteria were: (1) Student enrollment at a Jordanian university, and (2) ability to read and write in Arabic. There were no exclusion criteria to maximize the participation and variation of participants.

#### **Data collection procedure**

Prior to data collection, the primary investigator obtained ethical approval from research committee at the Faculty of Medicine and the targeted universities. An announcement placed at the students' advertisements board at the targeted universities. A package of three self-administered questionnaires, in addition to the author-developed demographic profile was sent to students who expressed interest in participation. The package included a cover page that presented the purpose of the study, its significance, and informed the participants that the study is anonymous. The cover letter also included contact information of the principal investigator and instructions of where to return the questionnaires. Two thousands packages were distributed and 1659 were returned with 83% response rate. Subject's information kept confidential by the investigators. All projects' electronic versions were kept in the primary investigator's computer (Saba et al., 2012; Saba et al., 2014).

#### **Instruments**

Data was collected using an Arabic version of the instruments. Numbers of procedures were used to determine the reliability and validity of the instruments. The instruments were first translated into Arabic language by a research assistant and back translated into English language by another independent research assistant as described by Rehman et al., (2011). The two English forms (the original and the translated) were compared in terms of conceptual rather than literal meaning of the items. The translator and the back translator met to examine the differences in the two forms. Pilot testing was conducted using university students (n = 15) who are bilingual requesting their appraisals for the appropriateness of the translation. The instruments are:

1. The Social Phobia Inventory (SPIN; Connor et al., 2000) was used to measure social phobia. SPIN is a 17-item self-report questionnaire for measuring a wide range of symptoms of SP. It consists of items that measure (a) fear in social situations (6 items), (b) avoidance of performance or social situations (7 items), and (c) physiological discomfort in social situations (4 items). Subjects are asked to rate the frequency of each symptom 0 (not at all), 1 (a little bit), 2 (somewhat), 3 (very much), or 4 (extremely) during the past week. The range of the sum score is thus 0 – 68.

Items assessing fear, avoidance, and physiological discomfort comprise, respectively, the fear, avoidance, and physiological discomfort subscales. In this study then scale had good reliability with Cronbach's alpha equal to .81 (Bekhti et al., 2011).

**Demographic profile:** information such as gender, age group, student's faculty, university academic year, working status, childhood abuse, alcohol use, smoking status, financial status and sources of social support were obtained from an investigator-developed checklist.

#### Analysis Plans

Social phobia described using the central tendency measures (means, and medians) and the dispersion measures (standard deviation and ranges). Pearson correlation Coefficient (Pearson r) used to test the correlation between selected factors. The t-test for two-independent samples used to test for differences in social phobia among university students in relation to selected demographic and personal factors (Saba et al., 2011).

#### Results:

##### Demographic data

The sample consisted of 1659 university students after screening and cleaning. Of the sample, 37.9% (n = 628) were males, and 62.1% (n = 1027) were females. The mean age for students was 20.7 (SD = 1.8), with ages ranging from 18 to 30 years and 75% of them were at age of 22 years or below. There were 1180 students (71.2%) coming from scientific schools, while only 478 (28.8%) students were enrolled in humanity schools. the majority of them were single (n = 1596, 96.2%). The majority of them (80%, n = 1322) were also coming from families of medium to good financial status (See table 1).

Regarding life styles and psychosocial background, history, the analysis (see table 1), showed that 81.25 (n = 1346) of the students were nonsmokers, while 18.8% (n = 311) of the students were active smokers. Moreover, only 7.3% (n = 120) were alcohol user compared to 92.7% (n = 1535) who had reported that they have never used alcohol. The analysis also showed that 13.3% (n = 220) of students reported being abused during their childhood, and 49.8% (n = 825) of them had experienced significant events like death of a loved one, a loss, or a severe disease to themselves or to a loved ones.

**Table 1: Demographic characteristics of university students in Jordan (N = 1659)**

Variable		n	%	M	SD	Min	Max	P <sub>25</sub>	P <sub>50</sub>	P <sub>75</sub>
Age		-	-	20.7	1.8	18	30	18	20	22
Gender	Male	628	37.9							
	Female	1027	62.1							
Students' faculty	Scientific	1180	71.2							
	Humanities	478	28.8							
Smoking status	Yes	311	18.8							
	No	1346	81.1							
Alcohol use	Yes	120	7.3							
	No	1575	93.7							
Hx. Childhood abuse	Yes	220	13.3							
	No	1435	86.7							
Stressful life events	Yes	825	49.8							
	No	828	50.1							

**Social phobia:** Regarding students' report of their social phobia symptoms, the analysis (see table 2) showed that the mean score for students in general was 16.4 (SD = 9.7), with scores ranging from 0 to 61. Furthermore, 75% (n = 1244) had a score of 22 or less, and 50% (n = 830) of them had a score between 9 and 22. Further analysis (see table 3) for the levels of social anxiety symptoms showed that the majority of

university students had no symptoms at all (72.1%, n = 1196), while mild symptoms found among 18.9% (n = 313), and those with severe to very severe represented 2.3% (n = 38). Using 19 as the adult cutoff score for social phobia suggested by (Connor et al, 2000), 30.6% (n = 508) of the students are considered suffering from social phobia (Saba and Altameem, 2013).

**Table 2: Descriptive analysis of SPIN among university students (N = 1659)**

Variable	M	SD	Min	Max	P <sub>25</sub>	P <sub>50</sub>	P <sub>75</sub>
Social anxiety –total score	16.4	9.7	0	61	9	16	22
Fear in social situations	5.4	3.7	0	22	3	5	8
Avoidance of performance or social situations	6.5	4.8	0	28	3	6	9
Physiological discomfort in social situations	4.6	3.3	0	16	2	4	7

In relation to subscales of SPIN, the analysis showed that the mean scores were as follow: fear in social situations ( $M = 5.4$ ,  $SD = 3.7$ ), avoidance of performance or social situations ( $M = 6.6$ ,  $SD = 4.8$ ) and physiological discomfort in social situations ( $M = 4.6$ ,  $SD = 3.3$ ). Using item analysis to examine the items that had the highest and lowest scores (see table 4), the analysis showed that the mean items ranged from .40 ( $SD = .83$ ) (item 3: *Parties and social events scare me*) to 1.57( $SD = 1.30$ ) (item 15: *Being embarrassed or looking stupid are among my worst fears*). The highest three items in addition to item 15 were item 12 ( $M = 1.13$ ,  $SD = 1.26$ : *I would do anything to avoid being criticized*) and item 2 ( $M = 1.25$ ,  $SD = 1.16$ : *I am bothered by flushing in front of people*). This also goes for the highest three items that students reported being very much to extremely experiencing social phobia symptoms over the past week as items 15, 12, and 2 had the highest percentage among all other items. Interestingly, the lowest mean item scores (item 1, 3, and 10) belong to fear of social situation subscale, while the highest mean item scores

varied among the three subscales. The results support the mean scores of the subscales mentioned above in table 2 that fear in social situation was the lowest reported subscale among the three subscales. In conclusion, student suffers social anxiety (social phobia) at a mild to moderate level, and about one third of the student showed positive symptoms of social phobia (score of  $> 19$ ). On the other hand, fear in social situations found to be the least concerned and reported among university students compared to physiological and avoidance behaviors subscales.

**Table 3: level of social phobia among university student (N = 1659)**

Variable	n	%
None	1196	72.1
Mild	313	18.9
Moderate	112	6.8
Severe	33	2.0
Very severe	5	.3

**Table 4: Item analysis of SPIN among university student in Jordan (N= 1659)**

	Item	M	SD	Not at all	Little	Somewhat	Very much to Extremely
1	I am afraid of people in authority	.77	.94	31.2	26.4	18.3	4.1
2	I am bothered by flushing in front of people	<b>1.25</b>	1.16	33.2	30.3	18.8	<b>17.7</b>
3	Parties and social events scare me	.40	.83	76.6	12.6	7.0	3.8
4	I avoid talking to people I don't know	1.11	1.16	39.4	27.8	20.9	11.9
5	Being criticized scares me a lot	.96	1.02	41.4	31.0	19.9	7.7
6	I avoid doing things or speaking to people for fear of embarrassment	1.17	1.17	36.0	31.2	18.4	<b>14.5</b>
7	Sweating in front of people causes me distress	1.12	1.19	41.0	26.6	17.5	4.8
8	I avoid going to parties	.58	1.02	69.4	13.8	9.7	7.1
9	I avoid activities in which I am the center of attention	.73	1.04	57.4	23.4	11.1	8.0
10	Talking to strangers scares me	.59	.89	61.8	23.0	11.4	3.9
11	I avoid having to give speeches	1.14	1.23	41.0	26.0	15.8	<b>15.5</b>
12	I would do anything to avoid being criticized	<b>1.31</b>	1.26	34.9	25.7	20.1	<b>19.9</b>
13	Heart palpitations bother me when I am around people	1.05	1.15	42.4	28.0	15.7	13.9
14	I am afraid of doing things when people might be watching	1.17	1.09	32.1	35.0	20.7	12.2
15	Being embarrassed or looking stupid are among my worst fears	<b>1.57</b>	1.30	26.5	26.2	19.2	<b>28.0</b>
16	I avoid speaking to anyone in authority	.56	.90	64.1	21.6	9.8	4.5
17	Trembling or shaking in front of others is distressing to me	1.16	1.20	39.5	26.8	16.2	<b>17.6</b>

**Bivariate analysis:** To examine differences among students related to their demographic and personal characteristics, number of test-statistics has been carried out (see table 5). Related to gender differences, the analysis using showed that male and female students were only different in regards to avoidance of performance or social situations ( $t = 2.31$ ,  $p = .021$ ) with mean score for male ( $M = 6.9$ ,  $SD = 5.0$ ) higher than female mean score ( $M = 6.3$ ,  $SD = 4.6$ ). While there was no significant difference between them in relation to total SPIN, physiological discomfort or fear in social situations subscales ( $p > .05$ ). Moreover, the analysis showed that there were significant and negative association between age of students and their total SPIN ( $-.07$ ,  $p < .001$ ), physiological discomfort ( $-.09$ ,

$p < .001$ ), or fear in social situations subscales ( $-.09$ ,  $p < .001$ ) indicating the younger students are more likely to experience social phobia than older ones. However, avoidance of performance on social situations had no significant correlation with students' age. Although the correlation between age and SPIN is statistically significant, the magnitude of correlations warrants clinical application and consideration.

Regarding differences related to type of students' faculty, the analysis showed that there were significant differences in SPIN and avoidance of performance on social situations between students in humanistic and scientific faculties ( $p < .05$ ), while there were significant differences in physiological discomfort or fear in social situations subscales related to students' type of faculty.

The analysis showed that students enrolled in humanity schools had less mean scores in all forms of social phobia than students in scientific schools (Haron et al., 2012). Regarding smoking status, the analysis showed that there were significant differences between smokers and nonsmokers in regards to SPIN total, physiological discomfort, and fear in social situations ( $p < .05$ ). Mean

scores of smokers found to be higher than mean score of nonsmokers. Furthermore, the analysis showed that there were significant differences between those who reported alcohol use and those who did not in regards to physiological discomfort, and fear in social situations ( $p < .05$ ).

**Table 5: differences in social phobia related to selected demographic and personal characteristics**

Variable			n	M	SD	Test statistics	
						t-test	p-value
Gender	Avoidance	Male	602	6.9	5.0	2.31	.021
		Female	986	6.3	4.6		
Type of student's faculty	SPIN	Scientific	1180	16.7	9.6	1.98	.047
		Humanities	478	15.7	9.9		
	Avoidance	Scientific	1142	6.7	4.7	2.08	.038
		Humanities	449	6.2	4.8		
Smoking status	SPIN	No	1346	16.7	9.7	2.36	.018
		Yes	311	15.2	9.6		
	Fear in social situations	No	1293	5.5	3.6	2.08	.038
		Yes	291	5.0	3.7		
	Physiological discomfort	No	1327	4.7	3.3	2.78	.006
		Yes	308	4.1	3.1		
Alcohol use	Fear in social situations	No	1470	5.5	3.6	2.14	.033
		Yes	112	4.7	4.0		
	Physiological discomfort	No	1514	4.6	3.3	2.30	.022
		Yes	119	3.9	3.2		

**Discussion:** Social phobia in this study was associated with younger age, female sex, none smoking, none drinking alcohol, and being a student in humanities faculties. The results do not correspond with previous international reports that have not found similar differences. One possible explanation is related to measurement issues as in this study SPIN has been used, while in other study WMH-CIDI was used (Kessler et al, 2005). The proposed explanation is that Muslims are brought up in a conservative values push predisposed individuals to increased level of social anxiety (Kessler et al, 2005). University students who are overwhelmed with life stressors (Kitzrow, 2003) are also at high risk for high social phobia if they were unable to manage effectively their fears and anxieties early in their education and university life. High level of social phobia will deteriorate mental health status and increase students' vulnerability to more psychological and mental dysfunctioning, lessen their educational performance, and increase risk for psychiatric morbidity.

**Conclusion:** Social phobia was prevalent among university students in Jordan. Age, gender and substance use are factors that contribute to high level of social phobia. Mental health professionals need to enhance u psychological wellbeing of university- aged individuals. In their periodic assessment, mental health professionals have to screen students for risk behaviors

and psychosocial health indicators such as social phobia, substance use, and life styles. In addition, the results indicate that the amount of history of abuse and alcohol and caffeine use has been linked to high level of social phobia, thus; interventions targeting university students should also emphasize healthy life styles. Interventions have to focus on helping students to overcome their anxiety symptoms, seek alternative sources for help and support in the community.

## References

1. Kusurkar R, Croiset G, Kruitwagen C, Ten Cate O. Validity evidence for the measurement of the strength of motivation for medical school. *Advance in Health Sciences Education* 2010; doi: 10.1007/s10459-010-9253-4.
2. Kessler RC, Berglund P, Demler O, Jin R, Merikangas KR, Walters EE. Lifetime Prevalence and Age-of-Onset Distributions of DSM-IV Disorders in the National Comorbidity Survey Replication. *Archives of General Psychiatry* 2005; 62 (6): 593–602.
3. Selamat, A. Phetchanchai, C. Saba, T. Rehman, A. (2010). Index financial time series based on zigzag-perceptually important points, *Journal of Computer Science*, vol. 6(12), pp. 1389-1395, doi. 10.3844/jcssp.2010.1389.1395.
4. Ahmad, AM., Sulong, G., Rehman, A., Alkawaz, MH., Saba, T. (2014) Data Hiding Based on Improved Exploiting Modification Direction Method and Huffman Coding, *Journal of Intelligent Systems*, vol. 23 (4), pp. 451-459, doi. 10.1515/jisys-2014-0007.

5. Harouni, M., Rahim, MSM., Al-Rodhaan, M., Saba, T., Rehman, A., Al-Dhelaan, A. (2014) Online Persian/Arabic script classification without contextual information, *The Imaging Science Journal*, vol. 62(8), pp. 437-448, doi. 10.1179/1743131X14Y.0000000083.
6. Rehman, A. Kurniawan, F. Saba, T. (2011) An automatic approach for line detection and removal without smash-up characters, *The Imaging Science Journal*, vol. 59(3), pp. 177-182, doi. 10.1179/136821910X12863758415649
7. Saba, T. Rehman, A. Sulong, G. (2010). Non-linear segmentation of touched roman characters based on genetic algorithm, *International Journal of Computer Science and Engineering*, vol 2(6), pp. 2167-2172.
8. Alqahtani, F.A. Saba, T. (2013) Impact of Social Networks on Customer Relation Management (CRM) in Prospectus of Business Environment, *Journal of American Sciences*, vol. 9(7), pp.480-486.
9. Shafry, MSM., Rehman, A. Kumoi, R. Abdullah, N. Saba, T. (2012) FiLeDI framework for measuring fish length from digital images, *International Journal of Physical Sciences*, vol.7(4), pp.607-618.
10. Sulong, G., Rehman, A., Saba, T. (2010) Improved offline connected script recognition based on hybrid strategy, *International Journal of Engineering Science and Technology*, vol.2(6), pp. 1603-1611.
11. Rad, A.E. Rahim, M.S.M, Rehman, A. Altameem, A. Saba, T. (2013) Evaluation of current dental radiographs segmentation approaches in computer-aided applications *IETE Technical Review*, vol. 30(3), pp. 210-222.
12. Joudaki, S. Mohamad, D. Saba, T. Rehman, A. Al-Rodhaan, M. Al-Dhelaan, A. (2014) Vision-based sign language classification: a directional Review, *IETE Technical Review*, vol.31(5), pp. 383-391, doi. 10.1080/02564602.2014.961576.
13. Elarbi-Boudihir, M. Rehman, A. Saba, T. (2011) Video motion perception using optimized Gabor filter, *International journal of physical sciences*, vol.6(12), pp. 2799-2806.
14. Bekhti, S., Rehman, A., Al-Harbi, M., Saba, T. (2011) AQUASYS: An Arabic question-answering system based on extensive question analysis and answer relevance scoring, *International Journal of Academic Research*, vol.3(4), pp.45-51
15. Saba, T. Rehman, A. Sulong, G. (2011) Cursive script segmentation with neural confidence, *International Journal of Innovative Computing and Information Control (IJICIC)*, vol. 7(7), pp. 1-10.
16. Haron, H. Rehman, A. Adi, DIS, Lim, S.P. and Saba, T. (2012). Parameterization method on B-Spline curve. *mathematical problems in engineering*, vol. 2012, doi:10.1155/2012/640472.
17. Norouzi, A. Rahim, MSM, Altameem, A. Saba, T. Rada, A.E. Rehman, A. and Uddin, M. (2014) Medical image segmentation methods, algorithms, and applications *IETE Technical Review*, vol.31(3), pp. 199-213, doi. 10.1080/02564602.2014.906861.
18. Saba T, Al-Zahrani S, Rehman A. (2012) Expert system for offline clinical guidelines and treatment *Life Sci Journal*, vol.9(4), pp. 2639-2658.
19. Saba, T. Rehman, A. Elarbi-Boudihir, M. (2014). Methods and Strategies on Off-Line Cursive Touched Characters Segmentation: A Directional Review, *Artificial Intelligence Review* vol. 42 (4), pp. 1047-1066. doi 10.1007/s10462-011-9271-5.
20. Muhsin; Z.F. Rehman, A.; Altameem, A.; Saba, A.; Uddin, M. (2014). Improved quadtree image segmentation approach to region information. the *imaging science journal*, vol. 62(1), pp. 56-62, doi. <http://dx.doi.org/10.1179/1743131X13Y.0000000063>.
21. Rehman, A. and Saba, T. (2011). Document skew estimation and correction: analysis of techniques, common problems and possible solutions *Applied Artificial Intelligence*, vol. 25(9), pp. 769-787. doi. 10.1080/08839514.2011.607009.
22. Rehman, A., Saba, T. (2011) Performance analysis of character segmentation approach for cursive script recognition on benchmark database, *Digital Signal Processing*, vol. 21(3), pp. 486-490, doi.10.1016/j.dsp.2011.01.016.
23. Saba, T., and Altameem, A. (2013) Analysis of vision based systems to detect real time goal events in soccer videos, *Applied Artificial Intelligence*, vol.27(7), pp. 656-667.
24. Lung, JWJ., Salam, MSH, Rehman, A., Rahim, MSM., Saba, T. (2014) Fuzzy phoneme classification using multi-speaker vocal tract length normalization, *IETE Technical Review*, vol. 31 (2), pp. 128-136, doi. 10.1080/02564602.2014.892669.
25. Hamdan-Mansour A, Dawani H. Social support and stress among university students in Jordan. *International Journal of Mental Health and Addiction* 2008;6(3):442-50.
26. Haron, H. Rehman, A., Wulandhari, L.A., Saba, T. (2011) Improved vertex chain code based mapping algorithm for curve length estimation, *Journal of Computer Science* vol. 7(5), pp. 736-743.
27. Hamdan-Mansour A, Marmash R. Psychological Well Being and General Health among Jordanian University Students. *Journal of Psychosocial Nursing and Mental Health Services* 2007; 45 (10): 31-9.
28. Meethongjan, K. Dzulkifli, M. Rehman, A. Altameem, A. Saba, T. (2013) An intelligent fused approach for face recognition, *Journal of Intelligent Systems* vol.22(2), pp. 197-212.
29. Rehman, A., and Saba, T. (2013) An intelligent model for visual scene analysis and compression, *International Arab Journal of Information Technology*, vol.10(13), pp. 126-136.
30. Saba, T. Rehman, A. Altameem, A. Uddin, M. (2014) Annotated comparisons of proposed preprocessing techniques for script recognition, *Neural Computing and Applications* Vol. 25(6), pp. 1337-1347 , doi. 10.1007/s00521-014-1618-9.