International Journal of Scientific Engineering and Research (IJSER)
ISSN (Online): 2347-3878
Index Copernicus Value (2015): 62.86 | Impact Factor (2015): 3.791

Effects of Workload on Low Back Pain among Kenya Airlines' Flight Attendants Operating at Jomo Kenyatta International Airport, Kenya

Jane Naitore Mugambi*[1], Charles Mburu[2], Prof. Robert Kinyua[3]

[1]Clinical Officer: Medical and Occupational Health, Kenya Airways, P.O. Box 25337 00100, Kenya
[2]Lecturer: Institute of Energy and Environmental Technology, JKUAT P.O. Box 62000- 00200, Kenya
[3]Director: Institute of Energy and Environmental Technology, JKUAT P.O. Box 62000- 00200, Kenya

[1]janaenaitomaugambi[at]gmail.com
[2]cmburu[at]jkuat.ac.ke
[3]kinyua[at]fsc.jkuat.ac.ke

Abstract: ***The purpose of the study was to assess the effect of workload on low back pain among Kenyan Airlines flight attendants operating at Jomo Kenyatta International Airport. The research study adopted descriptive research design and targeted 1,101 flight attendants of Kenyan Airlines operating at JKIA with a sample size of 285 respondents. The data collection tool was a semi-structured questionnaire that was self-administered through drop and pick. Data was analyzed using Stata 13 to aid in the development of descriptive and inferential statistics. The response rate of 96.1% (274 respondents) was attained. Results should that workload had the highest effect on low back pain with a co-efficient of 0.068. The main recommendation of the study is that both ICAO and IATA should re-examine the regulations pertaining to the number of hours a flight attendant should work within a specific period of time.***

Keywords: flight attendant; in-flight service; low back pain; passengers ratio; workload

1. Introduction

According to (1), low back pain (LBP) is pain, muscle tension, or stiffness localized below the costal margin and above the inferior gluteal folds, with or without leg pain (sciatica). (2) Stipulate that back pain is one of the most common and difficult occupational health problems with high prevalence among people in their working years. An increased risk of LBP was found in those whose jobs involved lifting, pulling, pushing objects or whose jobs involved prolonged periods of standing or walking (3). This risk factors for work are related to musculoskeletal disorders (WMS) and include non-neutral postures, forceful exertions, constrained or static postures, repetitive work, use of pinch grip, work over shoulder height, prolonged periods of time with the trunk inclined forward, twisting while lifting and both whole-body and segmental applied vibration (4)

Studies conducted in the USA showed that LBP is the commonest musculoskeletal illness with 12% – 30% of the population affected at any given time (5). According to the (6), the air transportation industry is hazardous and flight attendants had injury and illness rates comparable to those of all workers in their industry in 2003.According to a research conducted (7), to calculate the rate of injury amongst flight attendants it was noted that there was an increase in the rate of turnover of flight attendants in most of the flight companies in spite of the pay and prestige of being a flight attendant.

Workload is usually greater on the larger, wide-bodied aircraft, such as the 747, 777, or A340, due to the longer travelling distances from front to rear of the cabin, higher passenger-to-flight attendant ratios, and more stretching across rows of seats (8).

A study conducted by (9); The Prevalence of low back pain in Africa: A systemic review (2006) A total of 27epidemiological studies were included in the review. The majority of the studies (63%) were conducted in South Africa (37%) and Nigeria (26%). The most common population group involved workers (48%), while scholars comprised 15% of the population. 67% of the studies were found to be methodologically sound, and the LBP prevalence of these were analyzed. The mean LBP point prevalence among the adolescents was 12% and among adults was 32%. The average one year prevalence of LBP among adolescents was 33% and among adults was 50%. The average lifetime prevalence of LBP among the adolescents was 36% and among adults was 62%. The findings support the global burden disease of LBP. There was also suggestion of increasing prevalence of LBP Africa.

A study conducted in Mombasa, Kenya by (10): Assessment of work-related Musculoskeletal disorders (MSD) among nurses in Mombasa found out that out of 76.9% of reported cases of MSD, 70.9 had LBP. This was due to working in the same position for a long period of time and work load. Training on proper handling manual technic was recommended.

Therefore the study analyzed the effects of workload on LBP among Kenya airlines' flight attendants operating at Jomo Kenyatta International Airport (JKIA), Kenya. Transport and storage contributes 8.4% of Kenya GDP where the air industry falls; (11)

The Kenyan airline industry is a rapidly growing industry. The presence of flight attendants is a mandatory requirement as they provide in-flight services such as handling luggage, food and beverages, duty free sales,

safety and security to passengers. Working in moving aircrafts especially during turbulence, subject flight attendants to high-risk of back injury due to handling heavy luggage, overhead bins, service trolleys and air stair doors.

Thus flight attendants face the risk factor of work related musculoskeletal disorders. Therefore this research sought to analyze the effects of workload on low back pain among flight attendants of Kenyan Airlines operating at JKIA. This study is undertaken with the intension of reducing cases of LBP among flight attendants in order to increase productivity and efficiency. Hence the main objective of this study was to assess the effects of workload on low back pain among Kenya Airlines' flight attendants operating at Jomo Kenyatta International Airport, Kenya.

2. Literature Review

The environment in which flight attendants work coupled with the demands of their occupation results in mental as well as physical stress. As a result, many flight attendants frequently experience dry skin and eyes, back pain and sleep disorders; about 30 percent of them who fly long distance experience these three symptoms (Thomas, 2010).

A study conducted in Missouri– USA (12) sought to investigate the effects of flying on Indian male and female flight attendants who flew between 10 and 30 years. The study found that there are three major problems faced by the flight attendants. These are: stress (88.85%), back pain (72.65%) and headaches (58.42%). The flight attendants complained of the long working hours and understaffing with minimal and less comfortable resting time contributed to the back pain. The study recommended that reports on back pains could be remedied by providing better equipment and user-friendly galleys.

The diagrammatical discretional of the independent variable (workload) and dependent variable (low back pain) under study are represented by the operational framework.

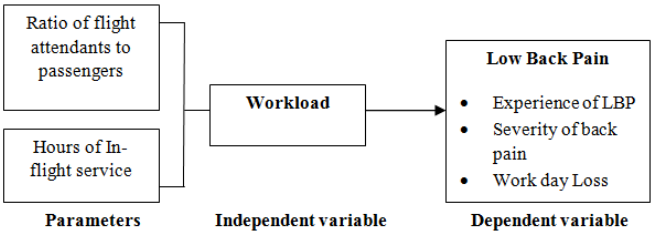

Figure 1: Operational Framework

3. Methodology

The study adopted a descriptive research design. According to (13), descriptive research design is best suited for the study as it provides varied information regarding the characteristics of the respondents. The target population was 1,101 flight attendants working at the Jomo Kenyatta International Airport, Kenya.

To attain a sample size of 285 potential respondents, at a 95% confidence interval, the study adopted Fisher's formulae (14).

$$n = \frac{Z^2_{1-\alpha/2} P(1-P)}{d^2}$$

Where:

n= minimum sample size required
Z = Standard normal deviation (1.96)
P= Assumed prevalence of low back pain in flight attendants
α = Level of significance at 95% confidence interval (5%)
d = Level of precision (acceptable error rate) = 0.05

Therefore; $n = \frac{1.96^2 \times 0.50 \times 0.50}{0.05^2} = 385$

As the target population is less than 10,000, Fisher prescribes that the sample size correction factor must be applied.

$$nf = \frac{n}{1+(n/N)}$$

Where:
n= current sample size
N=study population under consideration

Thus, $nf = \frac{385}{1+(385/1101)} = 285$

Simple random sampling method was used to select study participants. The research data collection instruments were semi structured questionnaires. For data management, averages were calculated in respective items from the generated frequency counts and frequency distributions and percentages used to describe and summarize data. For the inferential statistics, the co-efficient of correction was used to determine the strength of relationship between the independent and dependent variables. Additionally, with the aid of Stata 13, factor analysis was conducted and a regression model developed.

4. Discussion of Findings

The response rate was 96.1% of which 60% (165 out of 274) were female respondents and 40% (109 out of 274) were male. Majority of the respondents were between the ages of 31- 35 years (92 out of 274 representing 34%) while the least percentages were between the age of 20-25 (23 out of 274 representing 8%) and above 41 years (22 out of 274 representing 8%). This implies that flight attendants need to work at very fast, working with tight deadlines and over the weekends and/or late at night. Thus people with family and social commitments are not best suited. Those respondents with a work experience of over 5 years (181out of 274 representing; 66%) formed the majority.

Low Back Pain

Low back pain was measured by experience of back pains during flight attendant services, severity of back pains and work day loss as a result low back pains. Out of the total respondents, a large proportion (119; 43.91%) strongly agreed that they had ever experienced lower back pain, 73 (26.94%) agreed, 30 (11.07%) were neutral, 24 (8.86%) disagreed while 25 (9.23%) strongly disagreed.

One hundred and three (38.72%) of the respondents strongly agreed that the back pain was associated with work, 79 (29.70%) agreed, 42 (15.79%) were neutral, 19 (7.14%) disagreed, while 23 (8.65%) strongly disagreed. This is similar to findings from Ontario short haul carrier study (7) which showed that 63% of flight attendants' injuries were low back pain.

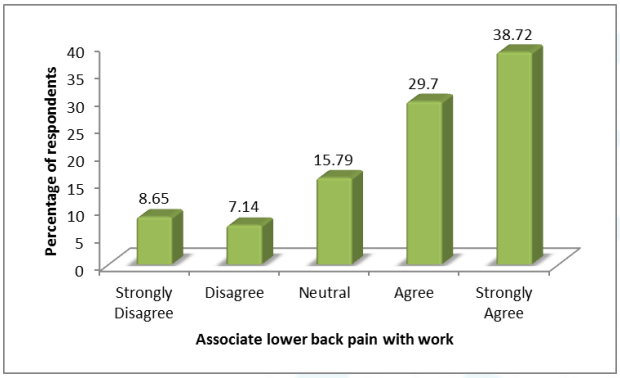

Figure 2: Low Back Pain and Work

Despite a huge percentage strongly agreeing that they had experienced lower back pain that was work related, most of the respondents (185; 68%) had not missed work due to lower back pain. Forty (14.71%) of the participants had missed 1-3 days, 24 (9%) had missed 4-6 days of work, 5 (2%) had missed 7-9 days while 18 (7%) had missed 10 days or more. This was in line with a study (15) whose results indicated that back injuries account for over 25% of lost time.

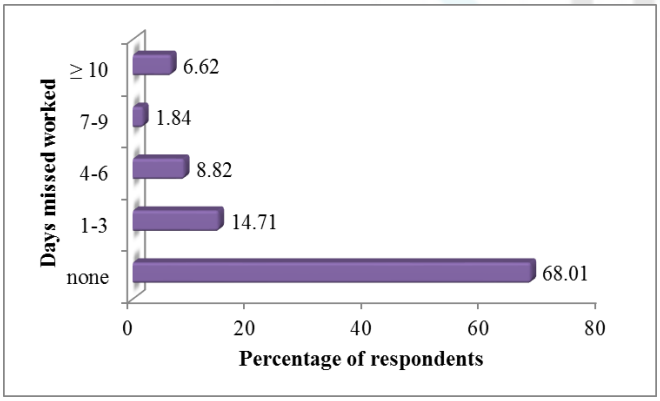

Figure 3: Work Days Missed Due to Low Back Pain

Respondents were asked about the severity of lower back pain related to flight attendants work. Forty (15.21%) strongly agreed that the pain is severe, 47 (17.87%) agreed, 95 (36.12%) were neutral, 44 (16.73%) disagreed, while 37 (14.07%) strongly disagreed.

Flight Attendants Work Load and Low Back Pain

The aim of this study was to assess the effects of workload on low back pain among Kenya Airlines' flight attendants operating at Jomo Kenyatta International Airport, Kenya.

There was a statistical difference on ratio of flight attendants to passengers on low back pain ($P<0.000$). A large proportion of respondents who had experienced LBP (128; 74%) strongly agreed that the ratio of attendants has an effect on LBP. Hours of service has an effect on LBP ($P<0.005$). A large proportion (103; 75.74) of respondents who strongly agreed that hours of in-flight service has an effect on LBP had ever experience low back pain. There was no statistical significance on low back pain and short flights ($P=0.237$). This indicates that respondents were more comfortable with their low back on short flights as compared to long flights. A large proportion of respondents who had ever experienced LBP also strongly disagreed that short flights have less effects on LBP (76; 69.42) $P=0.003$. This leaves attendants with no time to rest. There was no statistical association on never getting sick off due to low back pain ($P=0.348$). Among the respondents who had experienced back pains, the majority agreed with the sentiments that ratio of flight attendants to passengers has an effect on their low back. The understaffing leads to overworking and overwhelmed by the demands. This in turn leads to non-practice of safe manual handling techniques.

These findings are related to a study (12) which showed that 72% of flight attendants complained of back pains associated with understaffing and overworking. Flight attendants who worked for long hours were more likely to experience low back pain. Flight attendants on long flights walk for about 5-8 kilometres in an average 10 hour flight (16). Only a small proportion of the respondents (15%) were treated in hospital despite the high prevalence of low back pains (Table 1).

The Pearson correlation coefficient between variables flight attendants workload indicates a good relation of the variables thus there is no data singularity. Variable "I get treatment due to low back pain" does not correlate well with other variables thus it will be dropped. The correlation matrix has a determinant =0.254 which is greater than the necessary value of 0.00001. Therefore, multi-collineality is not a problem with the variables measuring flight attendants workload (Table 2).

Table 1: Distribution of Responses on Flight Attendants Workload

	Ever had LBP		Never had LBP				
Responses	**n**	**%**	**n**	**%**	**Total**	**X^2**	**P-value**
Ratio of flight attendants to passengers has effect on LBP							
Strongly Disagree	2	33.33	4	66.67	6	55.4929	**0.000**
Disagree	1	8.33	11	91.67	12		
Neutral	2	12.50	14	87.50	16		
Agree	13	33.33	26	66.67	39		
Strongly Agree	128	73.99	45	26.01	173		
Hours of inflight service has effect of LBP							
Strongly Disagree	2	22.22	7	77.78	9	46.0737	**0.000**
Disagree	2	16.67	10	83.33	12		
Neutral	9	25.71	26	74.29	35		
Agree	30	55.56	24	44.44	54		
Strongly Agree	103	75.74	33	24.26	103		
Am comfortable with low back on short flight							
Strongly Disagree	49	68.03	23	31.94	72	5.5306	0.237
Disagree	21	50.00	21	50.00	42		
Neutral	34	53.97	29	46.03	63		
Agree	26	57.78	19	42.22	45		
Strongly Agree	14	70.00	6	30.00 0000	20		
I get treatment in hospital on low back due to workload							
Strongly Disagree	27	38.57	43	61.43	70	24.2059	**0.000**
Disagree	40	57.97	29	42.03	69		
Neutral	49	69.01	22	30.99	71		
Agree	17	85.00	3	15.00	20		
Strongly Agree	11	84.62	2	15.38	13		
I never get sick off due to LBP in relation to much workload							
Strongly Disagree	26	48.15	28	51.85	54	4.4576	0.348
Disagree	29	56.86	22	43.14	51		
Neutral	41	60.29	27	39.71	68		
Agree	24	64.86	13	35.14	37		
Strongly Agree	20	68.97	9	31.03	29		
Short flights have less effects on LBP							
Strongly Disagree	76	69.72	33	30.28	109	16.4063	**0.003**
Disagree	23	56.10	18	43.90	41		
Neutral	16	36.36	28	63.64	44		
Agree	19	63.33	11	36.67	30		
Strongly Agree	8	44.44	10	55.56	18		
When it comes to LBP I prefer to work on long flights							
Strongly Disagree	9	45.00	11	55.00	20	17.2269	**0.002**
Disagree	6	31.58	13	68.42	19		
Neutral	27	50.00	27	50.00	54		
Agree	24	57.14	18	42.86	42		
Strongly Agree	78	72.22	30	27.78	108		

Table 2: Flight Attendants Workload Correlation Matrix

Correlation Matrix[a]								
		Ratio of flight attendants has effect	No. of hours has an effect	Low back ok with short flight	I get frequent treatment	I never get sick off due to backpain	Short flight have less effect on back pain	I prefer working on long flights
Correlation	Ratio of flight attendants has effect	1.000	.640	-.038	.192	.129	-.095	.418
	No. of hours has an effect	.640	1.000	.044	.089	.138	-.062	.309
	Low back ok with short flight	-.038	.044	1.000	.062	.025	.530	-.272
	I get frequent treatment	.192	.089	.062	1.000	.231	.120	.038
	I never get sick off due to back pain	.129	.138	.025	.231	1.000	.013	.051
	short flight have less effect on backpain	-.095	-.062	.530	.120	.013	1.000	-.381

	I prefer working on long flights	.418	.309	-.272	.038	.051	-.381	1.000
Sig. (1-tailed)	Ratio of flight attendants has effect		.000	.278	.001	.022	.070	.000
	N. Of hours has an effect	.000		.249	.083	.016	.170	.000
	Low back ok with short flight	.278	.249		.169	.348	.000	.000
	I get frequent treatment	.001	.083	.169		.000	.031	.278
	I never get sick off due to back pain	.022	.016	.348	.000		.421	.216
	Short flight have less effect on back pain	.070	.170	.000	.031	.421		.000
	I prefer working on long flights	.000	.000	.000	.278	.216	.000	
a. Determinant = 0.254								

The sampling adequacy need was met (Table 3) as the KMO statistic equated to 0.613, significance of p-value<0.0001.

Table 3: Flight Attendants Workload Sampling Adequacy Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.613
Bartlett's Test of Sphericity	Approx. Chi-Square	325.974
	Df	21
	Sig.	.000

Seven linear components were identified before extraction (there were same number of eigenvectors as variables).

The eigenvectors associated with each factor component represent the variance explained by that particular linear component. Three factors were extracted explaining 69.43% variability of flight attendants workload.

Table 4: Flight attendants workload Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.144	30.630	30.630	2.144	30.630	30.630	1.878	26.824	26.824
2	1.647	23.524	54.154	1.647	23.524	54.154	1.739	24.843	51.667
3	1.070	15.280	69.434	1.070	15.280	69.434	1.244	17.768	69.434
4	.779	11.128	80.562						
5	.580	8.280	88.842						
6	.450	6.432	95.274						
7	.331	4.726	100.000						
Extraction Method: Principal Component Analysis.									

The communalities indicated each question on flight attendants workload accounts for 20-40% of variability and 60-79% of variance is shared/common.

Table 5: Flight Attendants Workload Communalities

	Initial	Extraction
Ratio of flight attendants has effect	1.000	.794
N. Of hours has an effect	1.000	.767
Low back ok with short flight	1.000	.722
I get frequent treatment	1.000	.608
I never get sick off due to backpain	1.000	.631
Short flight have less effect on back pain	1.000	.739
I prefer working on long flights	1.000	.599
Extraction Method: Principal Component Analysis.		

The component matrix shows the developed themes on flight attendants workload. Short flights and low back pain have inverse effects on component 1. This is because short flights do not allow the attendants to take a break as compared to long flights thus causing low back pain.

Table 6: Flight Attendants Workload Component Matrix

	Component		
	1	2	3
Ratio of flight attendants has effect	.771	.384	-.229
I prefer working on long flights	.751	-.176	
No. of hours has an effect	.688	.424	-.337
Low back ok with short flight	-.403	.689	-.293
Short flight have less effect on backpain	-.517	.669	-.158
I never get sick off due to back pain	.225	.366	.668
I get frequent treatment	.177	.483	.585
Extraction Method: Principal Component Analysis.			
a. 3 components extracted.			

Regression Model Fitting

A linear regression model was fitted with low back pain being the dependent variable and independent variable being flight attendants work load. After fitting low back pain and flight attendants workload, the model was

significant (ρ,0.001; R^2 =0.27; $\overline{R}^2$ = 0.21). The regression model developed was (Table 7),

$$\hat{Y} = 0.438 + 0.068 X_1$$

Where

$\hat{Y} = LowBackPain$

$X_1 = Workload$

Table 1: Coefficients of Model

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	.438	.164		2.669	.008		
	Workload	.068	.009	.421	7.123	.000	1.000	1.000
a. Dependent Variable: LBP								

5. Conclusions

The study showed that most of the flight attendants were young (26-40) years with the majority being females. Low back pain was seen to be very common among flight attendants. The size of the aircraft and short flights also has an effect on low back pain especially during ascent and descent due to shifts in cabin pressure.

Workload was found to have an effect on low back pain such that every one unit change in workload resulted to 0.068 unit change in low back pain. The ratio of flight attendants to passengers was seen to greatly have an effect on low back pain. Additionally, the amount of hours on in-flight service was highlighted as a cause to low back pain where long flights were touted to have less effect on low back pain as compared to short flights.

6. Recommendations

Working conditions of flight attendants at JKIA are in dire need of an overhaul. Changes that would reduce chances of suffering from low back pain by flight attendants. Firstly, flight attendants working hours regulations should be re-examined so as to reduce work related fatigue and low back pains.

Secondly, the ratio of flight attendants to the passengers should be reviewed, with work allocation for flight attendants being based on number of passengers instead of type of aircraft. Lastly, flight attendants should be trained in different types of aircraft to enable them rotate between long and short flights, thus reducing the possibility of low back pain.

7. Suggestions for Further Study

1. Comprehensive studies to evaluate other causes of low back pain among flight attendants within the same Kenyan Airlines. This will allow for in-depth understanding by providing greater knowledge on the causes of low back pain.
2. The same study should be replicated within other flight attendants of non-Kenyan Airlines to provide a comparative analysis on the subject matter.

References

[1] Manek, N. J., & MacGregor, A. J. (2005).Epidemiology of back disorders: prevalence, risk factors, and prognosis. Current opinion in rheumatology, 17(2).
[2] Waddell. G. & Burnton, A.K. (2007). Occupational health guidelines for the management of low back pain at work: An evidence review.
[3] Macfarlane, G.J.(1997). Employment and physical work activities as predictors of future low back pain. Vol 22, Issue 10.
[4] Ranney D, Chronic musculoskeletal injuries in the workplace. Philadelphia: W.B. Saunders, 1997.Google Scholar
[5] Vandergrift JL, Gold JE, Hanlon A, Punnett L. (2012).Physical and psychosocial ergonomic risk factors for low back pain in automobile manufacturing workers. Occup Environ Med. http://dx.doi.org/10.1136/oem.2010.061770. Retrieved 14 April 2015.
[6] United States. (2013). FAR/AIM 2013: Federal aviation regulations/aeronautical information manual. New York: Skyhorse.
[7] United States. (2013). FAR/AIM 2013: Federal aviation regulations/aeronautical information manual. New York: Skyhorse.
[8] Loukopoulos, L. D., Dismukes, K., &Barshi, I. (2009). The multitasking myth: Handling complexity in real-world airtravel operations. Farnham, England: Ashgate Pub. Ltd.
[9] Quinette, L.(2006) The Prevalence of low back pain in Africa: a systematic review; www.biomedcentral.com/imedia/1642906590145338_manuscript.pdf
[10] Tanui, C.B. (2015) assessment of musculoskeletal disorders among nurse in Mombasa County ; Kenya ir.jkuat.ac.ke/handle/123456789/2240
[11] Economic Survey 2016: www.knbs.or.ke/index.php
[12] Sharma, Nagda &Radowicka (2013) Lifestyles, Flying and Associated Health Problems in Flight Attendants Missouri, USA .Journal of Aviation Research Network, 12(1), 141-149.
[13] Mugenda, O. M., & Mugenda, A. G. (2003).Research methods.Quantitative and qualitative approaches. Nairobi. Acts Press.http://www.ijsse.org IS

[14] Fleisher, G. R. (2012). Synopsis of a flight attendant's schedule. Philadelphia [etc.: Lippincott Williams & Wilkins.
[15] Hagihara, A., Tarumi, K., & Nobutomo, K. (2001).The number of steps taken by flight attendants during international long-haul flights. Aviation, Space, and Environmental Medicine, 72(10), 937-939.Retrieved April 8, 2015.
[16] Hagihara D. (2011). Spine: Rehabilitation Medicine Quick Reference. New York: Demos Medical Pub., LLC.
[17] Bernard, Shannon & Frank (2012) Musculoskeletal Disorders and the Work Place, Case of Lower Back And Upper Extremities Canada. Journal of Interscience Management Review, 2(2) 81-85