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Relationship between Job Satisfaction, Work Stress, Organizational Commitment and Turnover Intention of Chinese Medicine Practitioners in Hong Kong

By Ka-Kit Chua, Ph.D. & Hoi-Man Ng, DBA
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Abstract- Background: Chinese medicine (CM) industry has developed rapidly in recent years, but the turnover rate among Chinese medicine practitioners (CMPs) in Hong Kong is relatively high. The research on this issue is insufficient, inevitably giving rise to hidden concerns regarding the development of the CM industry.

Purpose: Explores the relationship between job satisfaction, work stress and organizational commitment among CMPs in Hong Kong and their turnover intention. Its results provide guidance regarding the CM industry's management and suggest future research directions.

Design: Online questionnaire was used to collect data on qualified CMPs in Hong Kong for investigation. After the pilot questionnaire, statistical analysis was used to correct the problem.

Keywords: *chinese medicine practitioners; job satisfaction; work stress; organizational commitment; turnover intention; hong kong.*

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Relationship between Job Satisfaction, Work Stress, Organizational Commitment and Turnover Intention of Chinese Medicine Practitioners in Hong Kong

Ka-Kit Chua, Ph.D.^α & Hoi-Man Ng, DBA^σ

Abstract- Background: Chinese medicine (CM) industry has developed rapidly in recent years, but the turnover rate among Chinese medicine practitioners (CMPs) in Hong Kong is relatively high. The research on this issue is insufficient, inevitably giving rise to hidden concerns regarding the development of the CM industry.

Purpose: Explores the relationship between job satisfaction, work stress and organizational commitment among CMPs in Hong Kong and their turnover intention. Its results provide guidance regarding the CM industry's management and suggest future research directions.

Design: Online questionnaire was used to collect data on qualified CMPs in Hong Kong for investigation. After the pilot questionnaire, statistical analysis was used to correct the problem. Questionnaire was forwarded by the Chinese Medicine Association and Organization through instant messaging software and online social platforms. Descriptive analysis, reliability analysis, correlation analysis and regression analysis were used.

Findings: From August 1 to 16, 2019, 141 valid questionnaires were collected. The reliability analysis confirmed the credibility of all of the variables. The correlation and regression analyses supported the hypotheses. Thus, job satisfaction has a negative relationship with turnover intention, work stress has a positive relationship with turnover intention and organizational commitment has a negative relationship with turnover intention.

Originality: Multiple regression analysis showed that the variables ranked in the following order of decreasing importance: organizational commitment > job satisfaction > work stress. To reduce the turnover rate among the CMPs, industry management must increase organizational commitment with some efforts to enhance job satisfaction and reduce work stress.

Keywords: *chinese medicine practitioners; job satisfaction; work stress; organizational commitment; turnover intention; hong kong.*

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I. INTRODUCTION

The Hong Kong Legislative Council formally enacted a subsidiary law on the registration of Chinese medicine practitioners (CMPs) in 2000. This requires CMPs to pass the registration examination of the Chinese Medicine Council of Hong Kong before they can practice in Hong Kong (Jiang & Che, 2000). Furthermore, since 2000, CMPs have been able to issue legally valid sick leave and work injury certificates. This has gradually improved the status and image of CMPs in the minds of Hong Kong citizens. With this improvement, senior citizens no longer constitute the majority of Chinese medicine (CM) supporters. More young people and highly educated people have begun to accept and use CM. For example, a study found that 71.1% of the women who had consulted a CMP were 15 to 54 years old and that 79.6% of the female patients seeking CMP consultation had a college degree or above (Chan & Chan, 2014). In addition, the Hong Kong Special Administrative Region (HKSAR) government has been actively developing CM. For example, the number of registered CMPs increased from 5,012 in 2005 to 6,243 in 2011 (Department of Health, 2012) and reached 7,404 in 2019 (Hong Kong Chinese Medicine Council, 2019). The number of CM clinics has also increased. In addition, the first CM hospital in Hong Kong has completed the first round of tenders. The attention and recognition of CM in the international community has also been strengthened. Hence, a group of capable CMPs is required to further the development of the industry.

Although the development prospects of the CM seem very optimistic, some have proposed that they are actually unknown. Despite seeming to support the CM industry, the government has not formulated a salary scale. The timetable for CM integration into public health care is also far from being confirmed. Furthermore, the salaries and benefits of CMPs are far lower than those of Western medicine doctors. For example, in 2019, the starting CMP salary was approximately HKD25,000, whereas the starting salary for Western medicine doctors was approximately HKD61,060. Previous research data have generally demonstrated a serious turnover rate

among Hong Kong CMPs. For example, 22.8% of Hong Kong CMPs had left their organizations in 2018-19 (Chua, Lau, Lee, & Lam, 2021). Such turnover may lead to a less favorable atmosphere in the industry and thereby reduce organizations' desire to cultivate and inherit CMPs and to practice CM.

According to representative information from major institutions, namely the Hospital Authority Tripartite Chinese Medicine Centre for Training and Research, university clinics, CM clinics operated by non-government organizations and private CM clinics, the turnover tendency of CMPs is related to job satisfaction (e.g., salary, management, interpersonal relationships and working environment), work stress and organizational commitment. Therefore, this study explores the relationships between these three factors and the high turnover among CMPs in Hong Kong. Furthermore, it uses the results to make feasible recommendations for management consideration.

II. METHOD

Qualified Hong Kong CMPs were targeted using online questionnaires to collect primary data. All of the collected data will be destroyed 3 years after study completion. It had been approved by the Ethics Committee of the Hong Kong Baptist University's Institutional Review Board (code: REC/19-20/0383).

a) Hypotheses

Job satisfaction, work stress and organizational commitment were used as the independent variables, and turnover intention was used as the dependent variable. Three hypotheses were investigated.

H_1 : Job satisfaction is negatively related to turnover intention.

H_2 : Work stress is positively related to turnover intention.

H_3 : Organizational commitment is negatively related to turnover intention.

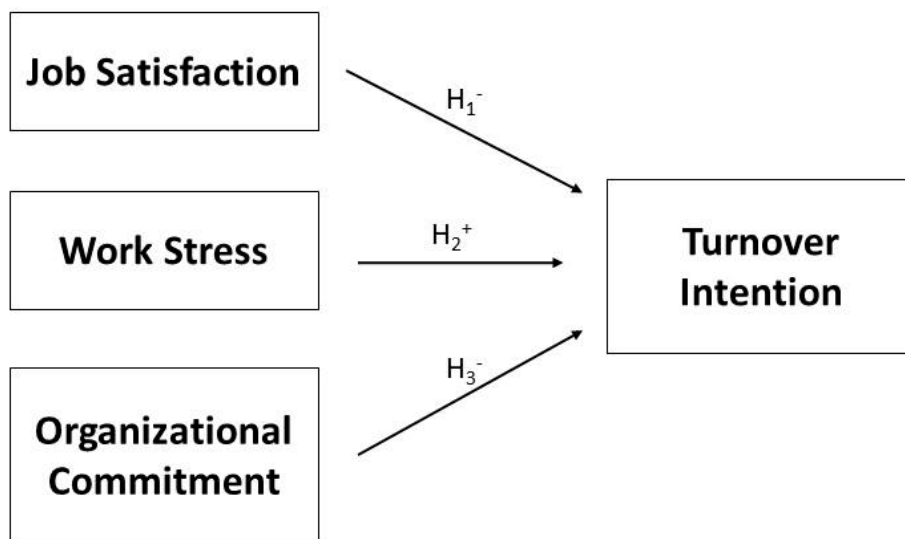


Figure 1: Model Factor and Coefficient

b) Participants

Any CMP (including registered CMPs, listed CMPs and limited registered CMPs) certified by the Department of Health in Hong Kong was included in the study regardless of their gender, age, job discipline and nature of their organizations, provided they were willing to participate in the online questionnaire. The respondents who were not qualified to practice lawfully in Hong Kong were not considered to be qualified respondents regardless of whether they had a CM degree.

c) Recruitment procedures

From August 1 to 16, 2019, the questionnaire was distributed in the form of an online Google questionnaire to major stakeholders in the CM industry, including the alumni of the three local universities (i.e.,

the Hong Kong Baptist University, the Chinese University of Hong Kong and the University of Hong Kong) and the Xinhua Chinese Medicine Promotion Association (a qualified CM association under the Hong Kong Chinese Medicine Council). The representatives forwarded the questionnaire link via mobile instant messaging software (e.g., WhatsApp) and Facebook groups to reach more CMPs.

d) Sample size calculation

For the multi-factor analysis, the following formula was used: $N \geq 50 + 8m$, where N is the required sample number and m is the number of different factors in the study (Green, 1991). Given the examination of four factors (i.e., job satisfaction, work stress, organizational commitment and turnover intention), the minimum estimated sample size required

was 82 people. Considering the generally estimated 5% sampling error for questionnaires, at least 87 valid questionnaires had to be collected to detect the relationships between the variables.

e) *Questionnaire development*

The questionnaire was divided into two parts, with the first part collecting basic information and the second part collecting variable-related information. All of the cited questions were from English questionnaires published in international journals. They were translated into Chinese and reviewed by the research team.

The first part collected the basic information of the interviewees. It was designed in reference to a survey of doctors' turnover intention in Guangdong, China (Lu et al., 2017). The wordings and some specific questions were adjusted according to the context of the CM industry and Hong Kong.

The second part collected data for the scoring of the research variables. It included four sections from four different journals: job satisfaction (Wang et al., 2017), work stress (Aderibigbe & Mjoli, 2018), organizational commitment (Lu et al., 2017) and turnover intention (Memon et al., 2017). To make the questionnaire more uniform, all of the options were changed according to a Likert 5-point scale (1 = "strongly disagree," 2 = "disagree," 3 = "neutral," 4 = "agree" and 5 = "strongly agree").

A pilot questionnaire was developed to check the appropriateness of the questions' wording and reduce ambiguity. At least 30 CMPs were invited to complete the pilot questionnaire, enabling its reliability to be examined. The variables with a Cronbach's alpha value over 0.7 were accepted.

After the pilot test, at least 87 valid questionnaires were to be collected. The electronic questionnaire mandated the respondents to answer all of the questions, yielding a low likelihood of obtaining

invalid questionnaires. The only questionnaires that were suspected to be invalid were those in which the respondents chose the same option throughout. These questionnaires were excluded. The full content of the formal questionnaire is provided in Supplementary Document 1.

f) *Statistical analysis*

All of the collected data were exported directly via online Excel to avoid human input errors. Then, in offline Excel, the results were adjusted and encoded into an SPSS format. Input methods were used twice. The same original data were encoded twice independently. The two data sets were statistically analyzed with SPSS 25.0, and the results were compared to ensure data accuracy.

Although the questionnaires were developed from published literature, they were not originally for CM. A reliability test of the pilot questionnaire was carried out, and Cronbach's alpha was used to analyze its reliability and stability. If the reliability was insufficient, the coefficient results were improved by subtracting the least relevant topics. A correlation test of Pearson's product-moment correlation coefficient was then conducted to identify any relationships between the variables and to determine the strength of these relationships. Further multiple regression analysis was used to confirm the strength of the relationships among the variables.

III. RESULTS

From July 28 to 31, 2019, 34 registered CMPs from different institutions were invited to complete the pilot questionnaire. All of their valid questionnaires were successfully collected (15 male and 19 female participants). The pre- and post-reliability credibility results (excluding the least related questions) are summarized in Table 1.

Table 1: Pilot Questionnaire Reliability Test Results

Variable	α	No. of questions	Removed questions	Revised α
Job satisfaction	0.901	1-28 (total: 28)	N/A	0.901
Work stress	0.865	29-35 (total: 7)	#30 (6 remained)	0.886
Organizational commitment	0.104	36-50 (total: 15)	#38,42,44,46,47,50 (9 remained)	0.906
Turnover intention	0.950	51-55 (total: 5)	N/A	0.950
Full questionnaire	0.514	1-55 (total: 55)	#30,38,42,44,46,47,50 (48 remained)	0.728

From August 1 to 16, 2019, the revised questionnaires were forwarded by the abovementioned major stakeholders in the CM industry to the CMPs. Ultimately, 141 valid questionnaires were successfully collected. Slightly more women (53.9%) than men completed the questionnaire. The main age group was between 31 and 40 years old (47.5%). Most of the participants had a Master's degree (53.2%). Furthermore, 99.3% were registered CMPs, and 97.2% were providing

consultation services. Among the entire sample, 75.2% were general practitioners and 46.8% had 4 to 9 years of work experience. Many of the respondents (34%) worked at the Hospital Authority Tripartite Chinese Medicine Centre for Training and Research (Tripartite Centre). Furthermore, 91.5% of the CMPs worked full-time, and 73.8% worked between 40 and 49 hours per week. Their monthly salaries largely ranged from HKD20,000 to HKD29,999 (42.6%). Many of the interviewees indicated

having no fixed working area (23.4%), and 84.4% of the respondents' major job was outpatient service. The details are shown in Table 2.

Table 2: Basic Interviewee Information

	Option(number of people; %)							
Gender	Male (63; 44.7)			Female (76; 53.9)			NIL (2; 1.4)	
Age	≤30 (64; 45.4)		31-40 (66; 46.8)		41-50 (7; 5.0)		≥ 51 (4; 2.8)	
Education	≤ Bachelor's(6;4.3)		Bachelor's (46;32.6)		Master's (75;53.6)		Doctorate (11;7.8) NIL (3;2.1)	
Qualifications	Registered CMP (140; 99.3)			Listed CMP (0; 0)			Limited registered CMP (1; 0.7)	
Practicing	Yes (137;97.2)				No (4;2.8)			
Major	General (109; 77.3)	Internal (10; 7.1)	Surgical (1; 0.7)	Gynecology (2; 1.4)	Pediatrics (1; 0.7)	Acupuncture (9; 6.4)	Orthopedics (3; 2.1)	Tuina (2; 1.4) NIL (4; 2.8)
Years of service	0~3 (54;38.3)		4~9 (66;46.8)		10~19 (17;12.1)		≥ 20 (4;2.8)	
Organization	Tripartite Centre* (48; 34)		NGO clinic (10; 7.1)		University clinic (14; 9.9)		Private clinic (35; 24.8) Self-employed (30; 21.3) Others (4; 2.8)	
State	Full-time (129; 91.5)			Part-time (11; 7.8)			Unemployed (1; 0.7)	
Work hours	≤39(22; 15.6)		40~49(104; 73.8)		50~59(7; 5)		≥ 60(6; 4.3) NIL (2; 1.4)	
Salary	≤9,999 (2; 1.4)		≤19,999 (7; 5)		≤29,999 (60; 42.6)		≤39,999 (38; 27) ≤49,999 (16; 11.3) ≤50,000 (16; 11.3) NIL (2; 1.4)	
Work district	Hong Kong Island (22; 15.6)		Kowloon East (15; 10.6)		Kowloon West (24; 17)		New Territories East (21; 14.9) New Territories West (23; 16.3) Unfixed (33; 23.4) NIL (3; 2.1)	
Major duty	Out-patient (119; 84.8)		Vehicle (3; 2.1)		Outreach (2; 1.4)		Administration (1; 0.7) Teaching (4; 2.8) Research (3; 2.1) Unfixed (7; 5) NIL (2; 1.4)	

NIL: Unwilling to disclose

a) Reliability test

The results of all of the items in the formal questionnaire were consistent with the results of the pilot questionnaire. Job satisfaction ($\alpha= 0.949$), organizational commitment ($\alpha= 0.937$) and turnover intention ($\alpha= 0.931$) demonstrated strong Cronbach's α values. Work stress ($\alpha= 0.830$) and the whole questionnaire ($\alpha= 0.886$) demonstrated acceptable Cronbach's α values. Thus, the formal questionnaire results demonstrated very high reliability.

b) Correlation test

The results of the correlation test are shown in Table 3. The relationships between job satisfaction and turnover intention ($r = -0.662$, $p < 0.01$) and between organizational commitment and turnover intention ($r = -0.659$, $p < 0.01$) were moderately statistically negative. However, the relationship between work stress and turnover intention ($r = 0.400$, $p < 0.01$) was moderately statistically positive.

Table 3: Correlation Test Results

		Job satisfaction	Work stress	Organizational commitment	Turnover intention
Job satisfaction	Pearson correlation	1	-0.457**	0.777**	-0.662**
	sig.(2-tailed)		0.000	0.000	0.000
	N	141	141	141	141
Work stress	Pearson correlation	-0.457**	1	-0.306**	0.400**
	sig.(2-tailed)	0.000		0.000	0.000
	N	141	141	141	141
Organizational commitment	Pearson correlation	0.777**	-0.306**	1	-0.659**
	sig.(2-tailed)	0.000	0.000		0.000
	N	141	141	141	141
Turnover intention	Pearson correlation	-0.662**	0.400**	-0.659**	1
	sig.(2-tailed)	0.000	0.000	0.000	
	N	141	141	141	141

** indicates that the correlation is significant at the 0.01 level (two-tailed).

c) *Regression analysis*

The results of the regression tests are summarized in Table 4. The results of the analyses of variance are summarized in Table 5.

Table 4: Regression Test Abstract

Model	R	R ²	Adjusted R ²	Standard error
1	0.662	0.438	0.434	0.87596
2	0.400	0.160	0.154	1.07075
3	0.659	0.434	0.430	0.87917
4	0.712	0.507	0.497	0.82582

1. Simple regression of job satisfaction and turnover intention.
2. Simple regression of work stress and turnover intention.
3. Simple regression of organizational commitment and turnover intention.
4. Multiple regression of job satisfaction, work stress, organizational commitment and turnover intention.

Table 5: Analysis of Variance Regression Results

Model		Sum of squares	df	Mean square	F	Sig.
1	Regression	83.047	1	83.047	108.231	0.000
	Residual	106.656	139	0.767		
	Total	189.703	140			
2	Regression	30.338	1	30.338	26.461	0.000
	Residual	159.365	139	1.147		
	Total	189.703	140			
3	Regression	82.265	1	82.265	106.431	0.000
	Residual	107.438	139	0.773		
	Total	189.703	140			
4	Regression	96.272	3	32.091	47.055	0.000
	Residual	93.431	137	0.682		
	Total	189.703	140			

1. Simple regression of job satisfaction and turnover intention.
2. Simple regression of work stress and turnover intention.
3. Simple regression of organizational commitment and turnover intention.
4. Multiple regression of job satisfaction, work stress, organizational commitment and turnover intention.

The results of the analysis of variance regression are shown in Table 5. Although the F test showed significant differences ($p < 0.05$) across all of the models, the interpretation of a single factor by R^2 was vitiated, and model 1-3 was relatively low in Table 4.

satisfaction and turnover intention and between organizational commitment and turnover intention were negative, whereas the relationship between work stress and turnover intention was positive. These results were consistent with those of the correlation test.

Table 6a shows the coefficient results of the regression test. The relationships between job

Table 6a: Regression Test Coefficient Results

Model		Unstandardized coefficients		Standardized coefficients	T	Sig.
		B	Std. Error	Beta		
1	(constant)	6.545	0.383		17.090	0.000
	Job satisfaction	-1.180	0.113	-0.662		
2	(constant)	0.925	0.345		2.684	0.008
	Work stress	0.610	0.119	0.400		
3	(constant)	5.182	0.258		20.110	0.000
	Organizational commitment	-0.803	0.078	-0.659		

1. Simple regression of job satisfaction and turnover intention.
2. Simple regression of work stress and turnover intention.
3. Simple regression of organizational commitment and turnover intention.

Table 6b: Multiple Regression Test Coefficient Results

Model	Non-standardized coefficient		Standardized coefficient		Sig.	Collinear statistics	
	B	Standard error	Beta	T		Tolerance	VIF
4 (constant)	5.244	0.603		8.700	0.000		
Job satisfaction	-0.531	0.182	-0.298	-2.912	0.004	0.344	2.906
Work stress	0.224	0.103	0.147	2.172	0.032	0.786	1.273
Organizational commitment	-0.466	0.116	-0.382	-4.004	0.000	0.394	2.538

1. Multiple regressions of job satisfaction, work stress, organizational commitment and turnover intention.

Multivariate regression analysis was performed using job satisfaction, work stress and organizational commitment as predictive variables (independent variables) and turnover intention as a dependent variable in Model 4. No collinear problems were found in any test. The R² value was 0.507, yielding a degree of turnover intention of 50.7% and reaching a medium intensity. The explanation by considering all variable was generally higher than that for a single variable. All three variables were significantly related to turnover intention. Job satisfaction (B = -0.531, p < 0.05) and organizational commitment (B = -0.466, p < 0.05) had negative relationships with turnover intention, whereas work stress (B = 0.224, p < 0.05) had a positive relationship with turnover intention. The following unstandardized regression model was used for this analysis:

$$\text{Turnover intention} = 5.244 - 0.531 \times (\text{job satisfaction}) + 0.224 \times (\text{work stress}) - 0.466 \times (\text{organizational commitment})$$

The following standardized regression model was used:

$$\text{Turnover Intention} = -0.298 \times (\text{job satisfaction}) + 0.147 \times (\text{work stress}) - 0.382 \times (\text{organizational commitment})$$

Therefore, the variables rank in the following order of importance: organizational commitment > job satisfaction > work stress.

d) Follow-up analysis of job satisfaction

In both the correlation analysis (r = -0.662, p < 0.01) and the simple regression analysis (R² = 0.438), job satisfaction showed the strongest relationship with turnover intention among the variables. Job satisfaction consists of six variables: 1) leadership and management, 2) training and promotion, 3) interpersonal relationships, 4) work environment, 5) compensation and welfare and 6) work function. Thus, it was worthwhile to examine which was the most important.

In the correlation analysis, all six variables showed moderately negative significant differences with turnover relationship. The details are shown in Supplementary Document 1.

In the multiple regression analysis of turnover intention and the six variables, leadership and management and work function demonstrated the strongest negative relationships with turnover intention (R² = 0.471). After gradually removing the variables that showed no significant relationship, an unstandardized regression model with an R² value of 0.447 was obtained (the details are shown in Supplementary Document 1):

Supplementary document 1: Follow-up analysis of each item in "Job Satisfaction "

Table 1: Correlations Test of Six Variables And Turnover Intention

		leadership and management	training and promotion	interpersonal relationship	work environment	compensation and welfare	work function	turnover intention
organizational commitment	Pearson correlation	-.598**	-.579**	-.443**	-.571**	-.562**	-.438**	1
	Sig.(2-tailed)	.000	.000	.000	.000	.000	.000	
	N	141	141	141	141	141	141	141

** The correlation is significant at the 0.01 level (two-tailed)

Table 2: Multiple Regression Test of Six Variables and Organizational Commitment Abstract

Model	R	R ²	Adjusted R ²	Standard error
1	.686 ^a	.471	.448	.86517

Table 3: Multiple Regression Test of Six Variables and Organizational Commitment Analysis of Variance

Model		Sum of squares	df	Mean square	F	Sig.
1	Regression	89.402	6	14.900	19.907	.000
	Residual	100.301	134	.749		
	Total	189.703	140			

Table 4: Multiple Regression Test of Six Variables and Organizational Commitment Coefficient Result

Model	Unstandardized coefficients		Standardized coefficients		Sig.	Collinear statistics		
	B	Std. Error	Beta	t		Tolerance	VIF	
1	(constant)	5.964	.527		11.323	.000		
	leadership and management	-.372	.123	-.290	-3.031	.003	.431	2.321
	training and promotion	-.219	.141	-.167	-1.551	.123	.339	2.946
	interpersonal relationship	.058	.192	.028	.305	.761	.462	2.164
	work environment	-.406	.132	-.268	-3.071	.003	.517	1.934
	compensation and welfare	-.145	.113	-.124	-1.290	.199	.428	2.335
	work function	.035	.144	.021	.243	.808	.514	1.945

Table 5: Multiple Regression Test of Leadership and Management, Compensation and Welfare, Work Function and Organizational Commitment Abstract

Model	R	R ²	Adjusted R ²	Standard error
1	.669 ^a	.447	.439	.87164

Table 6: Multiple Regression Test of Leadership and Management, Compensation and Welfare, Work Function and Organizational Commitment Analysis of Variance

Model		Sum of squares	df	Mean square	F	Sig.
1	Regression	84.856	2	42.428	55.844	.000 ^b
	Residual	104.847	138	.760		
	Total	189.703	140			

Table 7: Multiple Regression Test of Leadership and Management, Compensation and Welfare, Work Function and Organizational Commitment Coefficient Result

Model	Unstandardized coefficients		Standardized coefficient		Sig.	Collinear statistics		
	B	Std. Error	Beta	t		Tolerance	VIF	
1	(constant)	6.199	.355		17.450	.000		
	leadership and management	-.527	.096	-.411	-5.502	.000	.718	1.393
	work function	-.534	.113	-.353	-4.723	.000	.718	1.393

Turnover intention = 6.199 + -0.527 x (leadership and -0.534 work functions

IV. DISCUSSION

The correlation and regression analyses showed that job satisfaction, work stress and organizational commitment were statistically related to

turnover intention. Specifically, job satisfaction and organizational commitment demonstrated negative relationships with turnover intention and work stress demonstrated a positive relationship with turnover intention. This is consistent with logical expectations and

findings from other industry research (Salleh, et al., 2012).

a) *Job satisfaction*

The correlation and regression analyses showed that job satisfaction had a significantly negative relationship with turnover intention. The correlation intensity and the rationale in the regression were moderate. In the follow-up analysis, all of the constituent variables of job satisfaction demonstrated significantly negative relationships with turnover intention. Leadership and management and work function under job satisfaction were the most closely related domains to the turnover intention.

In this regard, CM institutions should frequently review their leadership, management style and system. They should listen more to employees' demands and regularly review CMP management. They should also regularly refer to the standards of other industries and other medicine-related professions. Instead of following the traditional authoritarian leadership style, leaders should consider using the participative and even delegative management styles. Organizational justices in different management areas should also be reviewed.

b) *Work stress*

The correlation and regression analyses showed that work stress had a significantly positive relationship with turnover intention. However, neither of the analyses yielded strong results. This suggests that despite the clear negative relationship between the two, the degree of interpretation, $R^2 = 0.094$, between them is not strong. Although this result seems inconsistent with some general research (Labrague et al., 2018), medical staff, including CMPs, generally have a stronger ability to resist stress than people in other industries. Thus, work stress may not explain the turnover intention of CMPs.

Stress can be both motivating and hindering. CM management should focus on dealing with hindering stressors (e.g., by accommodating individuals' family-work role conflicts, relaxing unreasonable deadlines and reducing unnecessary administrative works, etc.). Given the consistently significant negative relationship between work stress and turnover intention, CM institutions must still properly evaluate their employees' degree of work stress. Doing so may prevent high levels of work stress from combining with other factors and becoming a strong influence.

c) *Organizational commitment*

The correlation and regression analyses showed that organizational commitment had a significantly negative relationship with turnover intention. Similar to the results for job satisfaction, the correlation intensity and the rationale in the regression were moderate. It is common for employees to be more willing

to work in unfavorable situations if they are highly committed to their company.

Hence, CM institutions should improve the organizational commitment of their staff members in different ways (e.g., by providing a reasonable and friendly working environment with regular organizational gatherings and developing an inclusive environment among different groups of employees / practitioners, etc.).

d) *Multiple effects*

Separately examining the correlation analysis and regression analysis results for the relationships of job satisfaction, work stress and organizational commitment with turnover intention yielded results did not strongly explain CMPs' turnover tendency. All of the variables were moderately correlated with turnover intention, but their respective degrees of regression interpretation were weak, where R^2 of each variable were low in table 4. However, considering the three variables comprehensively via multiple regression analyses allowed for better interpretations to be made.

To reduce CMP turnover, the CM industry should consider all three aspects at the same time. Specifically, measures should be taken to 1) improve the job satisfaction of CMPs, 2) reduce the pressure on CMPs and 3) improve the organizational commitment of CMPs.

e) *Limitations*

Selection bias could be the biggest limitation of this trial. Over 70% of the respondents indicated that they were general CMPs, and most of them worked 40 to 49 hours per week. These findings are similar to those of a CM survey conducted by the HKSAR government (Department of Health, 2012). However, most of this study's respondents were women, in contrast to the male majority (67.6%) in the government's CMP survey (Department of Health, 2012). The majority of this study's respondents were under 40 years old, greatly different from the average CMP age of 58 years old in Hong Kong (Department of Health, 2012). Although this may suggest that the number of women in the young generation of CMPs is higher, it also showed there might have a selection bias on the included sample.

Also, over 60% of the CMPs who participated in this study's questionnaire held a Master's degree or above, and only 46.1% of them worked in the private sector. These findings are inconsistent with those reported in the HKSAR government's CMP survey, which indicates that less than 30% of CMPs hold Master's qualifications, and 88.2% work in the private sector. Nevertheless, although these results may suggest a possible selection bias during sampling, they may also indicate that the academic qualifications of CMPs have increased and that the working institutions have become

more diverse (Legislative Council Health Affairs Committee, 2018).

The respondents in this study were mostly young and had relatively short tenures as CMPs. Of the respondents, none were listed CMPs, and only one was a limited registered CMP. Senior CMPs may be less likely to participate in the study due to the online questionnaire setting. As age and tenure may cause some differences in the turnover behaviors and tendencies of employees, this study's results may not fully reflect the situation of all CMPs in Hong Kong. Furthermore, the questionnaires were mainly distributed to CM stakeholder organizations. However, most of the listed CMPs and limited registered CMPs were relatively independent individuals who were seldom involved in such organizations. Therefore, future research should consider how to increase the inclusion of older CMPs and other kinds of CMPs (e. g., by mailing physical questionnaires, completing personal interview questionnaires or conducting telephone interviews).

Lastly, cross-sectional approach, instead of longitudinal approach, was used in this research. Although it is easy to compare the variables at a single time point, this approach only shows the correlations but not the causations among the variables. It is suggested that in future research, the longitudinal approach should be adopted.

f) Future research direction

There may be different interpretations for our findings, one being that CMPs leave their present organizations and join other organizations in the Chinese Medicine industry while the other being that CMPs leave the Chinese Medicine industry. The former is at organization-level while the latter is at industry-level. The present study does not address this difference in turnover which should be taken into consideration in conducting future research as they in fact carry different implications.

V. CONCLUSION

The job satisfaction, work stress and organizational commitment of Hong Kong CMPs were significantly related to their turnover intention. Specifically, turnover intention was negatively related to both job satisfaction and organizational commitment but positively related to work stress. In addition, interactions were observed between various variables. Thus, to reduce CMPs turnover, CM industry should take all factors into consideration.

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Authors' contributions

All authors contributed to the study conception and design. Material preparation, data collection and analysis were performed by Ka-Kit Chua. The first draft of the manuscript was written by Ka-Kit Chua and all authors commented on previous versions of the manuscript. All authors read and approved the final manuscript.

Data Availability Statement

The datasets generated during and/or analysed during the current study are available from the corresponding author on reasonable request.

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Motor Disorders Related to Parkinson and Dopamine Evil

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Abstract- Parkinson's disease is a neurodegenerative disease characterized by dopamine depletion, death of the dopaminergic neurons of the substantia nigra of the nigrostriatal pathway and presence of neurofibrillary inclusion in the active neurons. The black substance is interconnected with all regions of the brain, they receive glutamatergic innervations and send direct and indirect projections, modulating the activity of the dopaminergic neurons, so the loss of dopamine in the striatum causes monoaminergic chemical changes leading to the increase and decrease of neuronal activity in the motor areas of the cerebral cortex. This study aims to understand the relationship of dopaminergic neurons to clinical symptoms in Parkinson's disease, to investigate physiological dysfunction and to point out the morphological alterations of the central nervous system.

Keywords: motor disturbances. basal ganglia and dopaminergic neurons.

GJMR-A Classification: NLM: WL 359, QV 140



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Motor Disorders Related to Parkinson and Dopamine Evil

Distúrbios Motores Relacionados Ao Mal De Parkinson E A Dopamina

Gessica Monique Rocha De Brito ^α & Sara Raquel Garcia De Souza ^ο

Resumo- A doença de Parkinson é uma doença neurodegenerativa caracterizada pela depleção da dopamina, morte dos neurônios dopaminérgicos da substância negra da via nigroestriatal e presença de inclusão neurofibrilares nos neurônios ativos. A substância negra esta interconectada com todas as regiões do cérebro, estas recebem inervações glutamatérgicas e enviam projeções diretas e indiretas, modulando a atividade dos neurônios dopaminérgicos, assim, a perda de dopamina no estriado causa alterações químicas monoaminérgicas levando ao aumento e diminuição da atividade neuronal nas áreas motoras do córtex cerebral. Este estudo tem por objetivo compreender a relação dos neurônios dopaminérgicos com os sintomas clínicos na doença de Parkinson, investigar a disfunção fisiológica e apontar as alterações morfológicas do sistema nervoso central. Foi realizada uma pesquisa descritiva do tipo revisão bibliográfica, através de documentos disponíveis nas bases de dados: LILACS, SCIELO, PUBMED e Google Acadêmico, utilizando-se os seguintes descritores: doença de Parkinson, dopamina, gânglios da base e neurônios dopaminérgicos. Foram selecionados documentos que incluíssem: dissertações, teses, artigos e livros que abordassem o tema, entre os anos de 2008 a 2018, disponíveis na íntegra nos idiomas português e inglês. Revisamos como a dopamina se adéqua no SNC e os prejuízos causados devido sua disfunção na doença de Parkinson. De forma geral, este estudo mostra a importância do equilíbrio fisiológico entre as vias neuronais, estabelecendo a relação das estruturas cerebrais com os neurotransmissores responsáveis pelo planejamento e execução do movimento juntamente com as alterações físicas que ela provoca.

Palavras-Chave: *distúrbios motores. gânglios da base e neurônios dopaminérgicos.*

Abstract- Parkinson's disease is a neurodegenerative disease characterized by dopamine depletion, death of the dopaminergic neurons of the substantia nigra of the nigrostriatal pathway and presence of neurofibrillary inclusion in the active neurons. The black substance is interconnected with all regions of the brain, they receive glutamatergic innervations and send direct and indirect projections, modulating the activity of the dopaminergic neurons, so the loss of dopamine in the striatum causes monoaminergic chemical changes leading to the increase and decrease of neuronal activity in the motor areas of the cerebral cortex. This study aims to understand the relationship of dopaminergic

neurons to clinical symptoms in Parkinson's disease, to investigate physiological dysfunction and to point out the morphological alterations of the central nervous system. A descriptive search of the bibliographic review type was carried out using the following descriptors: Parkinson's disease, dopamine, basal ganglia and dopaminergic neurons. Documents that included dissertations, theses, articles and books dealing with the topic were selected from 2008 to 2018, available in Portuguese and English. We reviewed how dopamine fits into the CNS and the damage caused due to its dysfunction in Parkinson's disease. In general, this study shows the importance of the physiological balance between the neuronal pathways, establishing the relation of the cerebral structures with the neurotransmitters responsible for the planning and execution of the movement together with the physical changes that it causes.

Keywords: *motor disturbances. basal ganglia and dopaminergic neurons.*

1. INTRODUÇÃO

A doença de Parkinson é a segunda doença neurodegenerativa com maior incidência no mundo, frequente em pessoas com idade acima dos 50 anos, havendo, raras exceções (WERNECK, 2010). Atualmente considera-se multifatoriais suas causas, apresenta-se como uma doença neurodegenerativa grave, debilitante, irreversível e polissintomática (BRANDAO; ARAÚJO; COIMBRA, 2015).

A doença de Parkinson leva a uma condição de hipocinesia, incluindo: perda de força muscular, lentidão de movimento (bradinesia), dificuldade no ato motor (acinesia), hipertonia muscular (rigidez), instabilidade postural, tremor das mãos e mandíbula (PAIXÃO et al., 2013). Tais sintomas originam-se da neurodegeneração dos neurônios dopaminérgicos da substância negra e atenuação da dopamina (MONTEIRO, 2010).

É notório que as disfunções motoras sejam atribuídas ao não suprimento de dopamina para os neurônios gabaérgicos dos gânglios da base que causam lesões focais nas áreas motoras do córtex cerebral (lobo frontal) levando ao comprometimento nigro-estriatal. Essas alterações provocam o retrocesso dos mecanismos de aprendizagem e execução do ato motor e conseqüentemente anomalia dos movimentos voluntários, como: apraxia da marcha (freezing), perda de reflexos posturais, desequilíbrio, marcha do tipo subcortical hipocinética (lentidão, postura fletida,

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redução da elevação dos pés, arrastamento e encurtamento dos passos) (BUGALHO, 2013; SAWAMOTO et al., 2008; SOUZA et al., 2011).

Perspectivas apontam que com o aumento da expectativa de vida em meados de 2020 o número de indivíduos acometidos pela doença de Parkinson chegue a 140 milhões de pessoas no mundo (LIMA et al., 2009).

Dessa forma, o presente estudo objetiva descrever a relação neurodopaminérgica com o Parkinson, seus aspectos fisiológicos, morfológicos e clínicos.

II. METODOLOGIA

Esta pesquisa caracteriza-se como descritiva do tipo revisão bibliográfica. Foram analisados artigos científicos, dissertações e teses que abordassem o assunto em pauta, através de um levantamento nas bases de dados SCIELO (Scientific Electronic Library Online), PUBMED (National Library of Medicine), LILACS (Literatura Latino-americana e do Caribe em Ciências da Saúde) e Google Acadêmico, usando os seguintes descritores: doença de Parkinson, distúrbios motores, gânglios da base e neurônios dopaminérgicos.

Os documentos foram analisados e selecionados considerando apenas publicações científicas que abordassem o tema em língua portuguesa e inglesa entre os anos de 2008 e 2018. Esta pesquisa teve início em 03 de novembro de 2018 e conclusão em 15 de fevereiro de 2019.

III. RESULTADOS E DISCUSSÃO

Após a realização do levantamento dos dados descritos na literatura sobre o papel da dopamina e a disfunção causada no controle dos tônus e da locomoção e, mais especificamente, sobre as implicações clínicas na doença de Parkinson, os resultados foram listados para discussão.

a) Aspectos anatômicos dos movimentos motores

A ação motora se estabelece através de uma variedade de núcleos subcorticais formados por grupos celulares que se conectam entre si arquitetando uma espécie de rede funcional responsável pela aprendizagem motora, execução dos movimentos e comportamento (BUGALHO, 2013; LANCIÉGO; LUQUIM; OBESO, 2012).

Os gânglios da base ou núcleos da base (NB) correspondem a núcleos inseridos profundamente nos hemisférios cerebrais, são estruturas telencefálicas subcorticais que juntamente com estruturas do diencéfalo (núcleo subtalâmico), mesencéfalo (substância negra) e ponte (núcleo pedúnculo pontino) recebem aferências de todo o córtex cerebral e enviam eferências ao córtex frontal via tálamo e aos núcleos motores do tronco encefálico (LANCIÉGO; LUQUIM; OBESO, 2012; LIMA, 2014). Os NB são formados por

duas estruturas denominado: caudado e putâmen, estas dão origem ao corpo estriado, considerado o ponto de entrada dos impulsos glutamatergicos que vão em direção aos núcleos basais responsáveis pelo planejamento e execução dos movimentos. Essa organização funcional dos NB forma circuitos denominados fronto-estriatais, cada circuito direciona a uma porção do lobo frontal sendo que de cinco circuitos, dois correspondem à ação motora (SCALZO; TEIXEIRA JUNIOR, 2009; SOUSA, 2016).

Os núcleos subtalâmicos podem ser classificados como: A) Núcleos de entrada: núcleo caudado (NC), putâmen (Put) e núcleo acumbens (Acb), estes recebem informações aferentes de diferentes locais; B) Núcleos de saída: globo pálido (GP) e substância negra pars reticulada (SNpr), enviam informações dos gânglios da base ao tálamo; C) Núcleos intrínsecos: segmento externo do globo pálido (GPe), núcleo subtalâmico (STN) e substância negra, permanece entre os núcleos de entrada e saída. A sinalização aferente cortical e talâmica se inicia no estriado: NC, Put e Acb, posteriormente são processadas nos gânglios da base (LANCIÉGO; LUQUIM; OBESO, 2012). Essa classificação dá origem às alças de conexão interneural que podem ser divididas em direta e indireta moduladas por impulsos dopaminérgicos provenientes da substância negra (SOUSA, 2016). É sabido que o estriado contém várias populações pequenas, porém considerável, de interneurônios colinérgicos. Esses interneurônios participam na intercomunicação entre as vias direta e indireta, sendo que quando a dopamina circulante permanece escassa a acetilcolina intensifica sua ação (STANDAER; GALANTER, 2012).

b) Neurônios estriatais: de projeção e interneurônio

Todo o córtex se projeta para o estriado, esta é a maior estrutura subcortical no cérebro, contém dois tipos de neurônios: neurônios de projeção e interneurônios. Os neurônios de projeção também chamados de neurônios espinhosos são neurônios inibitórios que usam o GABA como neurotransmissor (WILLARD; BOUCHARD; GITTIS, 2015). Os neurônios estriados se projetam diretamente para o globo pálido interno e substância negra, possuem receptores da dopamina do subtipo 1 (D1) e ativam a sinalização da adenilciclase facilitando a transmissão cortico-estriatal. Os neurotransmissores estriatais inervam o globo pálido externo apresentam o subtipo 2 de receptor de dopamina (D2), inibe a adenil-ciclase intracelular e dá origem a via indireta (estriado – globo pálido externo (GPE) – núcleo subtalâmico (STN) – globo pálido interno /substância negra pars reticulata (GPI/SNR), atenuando a transmissão cortico-estriatal (SURYANARAYANA et al., 2018). Ainda existe um grupo abundante de interneurônios, são neurônios colinérgicos grandes e finos que usam acetilcolina como neurotransmissor,

exibem um padrão de atividade bastante contínuo e constante de disparo, podem ser denominados neurônios tonicamente ativos (WILLARD; BOUCHARD; GITTIS, 2015)

c) *Dopamina*

A dopamina é um neurotransmissor catecolamínico e seus receptores estão acoplados a proteína G, são classificadas de acordo com a ação na formação do AMP cíclico (cAMP). A ativação dos receptores D1 aumentam o cAMP e a ativação dos receptores D2 inibem a produção de cAMP. A classe D1 contém 2 receptores (D1 E D5), enquanto a classe D2 contém (D2, D3 E D4), ambos exibem grande quantidade no estriado (núcleo caudado e putâmen), ativam a motricidade dos núcleos da base (STANDAERT; GALANTER, 2012).

A dopamina se encontra em maior proporção no estriado, seus tratos projetam-se da substância negra até as inervações do núcleo caudado e putâmen (STANDAERT; GALANTER, 2012).

Na substância negra, os melanócitos produzem dopamina que é transportada pela via nigro-estriatal, armazenada no núcleo estriado, particularmente no putâmen (ROSSO; NICARETTA; MATOS, 2008). Quando a dopamina diminui ocorre um aumento da acetilcolina circulante que leva a um desequilíbrio entre neurotransmissores, posteriormente, a acetilcolina ativa o processo de contração muscular que ocorre quando há uma redução de 25% da atividade dos neurônios dopaminérgicos (SOUZA et al., 2011)

d) *Substância Negra e Neuromelanina*

A neuromelanina é uma substância de pigmento escuro, complexo e insolúvel, aglomera-se nos neurônios dopaminérgicos da substância negra, núcleos catecolamínicos do tronco cerebral e neurônios adrenérgicos do lócus ceruleus. É um subproduto do metabolismo das catecolaminas dopamina e da noradrenalina, juntamente com interações subsequentes como proteínas, lipídios e metais. O pigmento é depositado em organelas citoplasmáticas rodeada por uma membrana dupla (SILVA, 2016; ZUCCA et al., 2014).

A abundância de neuromelanina no SNC começa muito cedo na vida e se prolonga até a senescência. Acredita-se que ela proteja os neurônios do estresse oxidativo mediado por metais livres ou radicais livres, porém, a sobrecarga de ferro ou aumento do oxigênio reativo contribui para a inflamação, ativando a micróglia e danificando os neurônios em um ciclo vicioso (REIMÃO et al., 2014; ZUCCA et al., 2014).

e) *Corpos de Lewy*

A principal evidência morfológica da DP é a presença de inclusões neurofibrilares. Essas inclusões são agregados proteicos anormais no citoplasma dos neurônios vivos no mesencéfalo, onde a α -sinucleína é

a mais abundante e posteriormente a ubiquitina. Estudos indicam que as mutações pós- traducionais das proteínas, como fosforilação, nitração e oxidação podem influenciar na formação dos agregados de forma circular (Corpo de Lewy) (LANCIEGO; LUQUIM; OBESO, 2012; SOUSA, 2016).

f) *Fisiopatologia da Doença de Parkinson*

A Doença de Parkinson é uma doença multifatorial. Estudos mostram que apesar de existirem diversos fatores de pré-disposição genética e vulnerabilidade regional à morte celular, o estresse oxidativo tem se mostrado um mecanismo único em doenças neurodegenerativas (BRANDAO; ARAÚJO; COIMBRA, 2015).

A "paralisia agitante" se dá devido à perda da capacidade de neurotransmissão dopaminérgica (MONTEIRO, 2010), extinção dos neurônios dopaminérgicos na região pars compacta da substância negra e presença de acúmulo de inclusões intraneurais (Corpos de Lewy). Há hipóteses de que os Corpos de Lewy sejam a resposta celular de proteção contra o dano celular em que as citocinas provocam reações imunológicas exageradas, promovendo migração de células do sistema imune para o sistema nervoso causando o Parkinsonismo (BRANDAO; ARAÚJO; COIMBRA, 2015).

Os núcleos basais não possuem conexão direta com os neurônios motores espinais, assim, não controlam diretamente o movimento dos músculos. Parte do processamento das informações é realizada pelos núcleos basais no estriado, os neurônios espinhosos são responsáveis pela transmissão de sinais para a via direta e via indireta (STANDAERT; GALANTER, 2012), seu funcionamento apropriado requer que a dopamina de origem da substância negra seja liberada nos núcleos de entrada (LANCIEGO; LUQUIM; OBESO, 2012).

Fisiologicamente, o equilíbrio entre as vias diretas e indiretas regula o movimento. A via direta é formada por neurônios estriatais que apresentam receptores D1 de dopamina, emergem-se para a saída dos núcleos da base, globo pálido interno. Há uma inibição do tálamo que envia projeções excitatórias ao córtex, dando início ao movimento. Dessa maneira, a via direta estimula o movimento. A via indireta, composta por neurônios estriatais predominantemente receptores D2, projeta-se para o segmento externo do globo pálido que inibe neurônios no núcleo subtalâmico, estes que são neurônios glutamatérgicos excitatórios se projetam para o segmento interno do globo pálido. A redução de dopamina circulante na via nigro-estriatal leva a um aumento do disparo tônico dos neurônios GABAérgicos localizados no GPI e SNR; decorrente da menor facilitação da via direta e inibição da via indireta. Em consequência, a ativação da via indireta excita os neurônios do núcleo subtalâmico, que estimula

neurônios no segmento interno do globo pálido a inibir o tálamo, isto é, a via indireta inibe o movimento. Porém no Parkinson, observa-se o oposto, a depleção de dopamina circulante leva a via direta a apresentar uma redução de atividade, enquanto a via indireta encontra-se hiperativa, resultando em redução do movimento (STANDAERT; GALANTER, 2012).

A acetilcolina e dopamina interagem entre si e desempenham um papel importante no controle motor, o desequilíbrio entre os neurotransmissores no sistema nigro-estriatal estabelece as desordens extrapiramidais. A acetilcolina depende da inibição contínua dos receptores D2, com a depleção da dopamina ocorre aumento da acetilcolina, que estimula os receptores muscarínicos do estriado pertencentes à família dos receptores acoplados a proteína G. Os receptores M2 e M4 ligam-se a proteína G inibitória, inativando a atividade da adenociclase, reduzindo os níveis intercelulares de AMP cíclico, dessa forma, ocorre um bloqueio e uma excitação do movimento, levando a disfunção motora (RODRIGUES, 2012).

Os receptores muscarínicos estão presentes no SNC divididos em: subtipo M1: córtex, hipocampo, estriado e tálamo; M2: no tálamo, córtex, hipocampo, estriado e terminais colinérgicos; M3: córtex e hipocampo; M4: córtex, hipocampo e abundantemente no estriado; M5 discretamente na substância negra. O Subtipo M4 é primordial no desempenho do controle motor e liberação da dopamina (LANGMEAD; WATSON; REAVILL, 2008).

Com a consequente diminuição das células produtoras de dopamina na via nigroestriatal, os neurônios que contêm neuromelanina no tronco cerebral, na camada ventral da parte compacta da substância negra e do lócus cerúleos (SOUZA et al., 2011) sofrem despigmentação (REIMÃO et al., 2014).

Estudos do mapeamento dos circuitos neurais mostram que a degeneração neural também se associa com a axonopatia e disfunção sináptica da substância branca, ocorre uma diminuição das conexões no caudado e hipotálamo, mesmo em estágios iniciais da doença. Alterações funcionais no córtex, estriado, córtex orbitofrontal e gânglios basais, se agravam de acordo com a perda de dopamina. A DP ocasiona uma disfunção sináptica e há mudanças na plasticidade sináptica, às mudanças dopaminérgicas pré-sinápticas altera a plasticidade pós-sináptica, resultando em dano axonal retrógrado e morte neural (TINAZ et al., 2017).

g) *Sinais e sintomas*

A marcha perfeita é o resultado harmônico entre sistema nervoso central, periférico, neuromuscular e esquelético, associadas a uma flexibilidade muscular dinâmica e estática que favorecem o alinhamento biomecânico e desempenho muscular. Alterações do sistema nervoso central podem interferir na cadência e na qualidade de vida do indivíduo (ATTA et al., 2010).

Quando o portador do Parkinson apresenta os sinais e sintomas da doença é possível que haja uma perda de 40% a 60% dos neurônios dopaminérgicos e uma redução de 80% da dopamina no estriado, a causa principal dos sintomas são causados pela atividade desorganizada de neurônios nos gânglios da base. Os distúrbios que possuem uma base patológica claramente estabelecida são: síndrome parkinsoniana ou rígido-acinético: rigidez, acinesia, tremor de repouso e instabilidade postural (ALVAREZ; GALLEGO; GOMEZ, 2012). No entanto, o maior comprometimento clínico é dado pelas posturas anormais graves, estas: Síndrome da Cabeça Caída (dropped head), Camptocormia e Síndrome de Pisa (ROCHA, 2015).

É evidente o retrocesso dos mecanismos de aprendizagem e execução do ato motor na evolução do Parkinson, essas alterações são caracterizadas por lesões focais do córtex pré-frontal. Os circuitos fronto-estriatal fazem íntima relação com a conexão entre lobo frontal e gânglios da base (BUGALHO, 2013). Os primeiros indícios podem afetar um lado do corpo até envolverem todo o corpo, sua progressão diminui a capacidade do indivíduo se mover com facilidade (GITTIS, 2018; LANCIEGO; LUQUIM; OBESO, 2012; SOUZA et al., 2011), a musculatura apresenta-se rígida denominada de hipertonia plástica (roda dentada), acomete inicialmente os músculos proximais, progredindo para face, membros superiores e inferiores (SOUZA et al., 2011; WERNECK, 2010).

A rigidez ocorre devido à inibição recíproca anormal, a excitação incomum dos interneurônios inibitórios permanece ativada, visto que, os interneurônios da coluna vertebral são modulados por conexões descendentes supraespinhosas provocando constante hipertonia muscular (ALVAREZ; GALLEGO; GOMEZ, 2012). Essas alterações da musculatura causam modificações no arco escapular e pélvico, ocorre diminuição da mobilidade do quadril, joelhos, tornozelos, vértebras, perda de força muscular, redução da mobilidade, flexibilidade e assimetrias corporais (MONTEIRO et al., 2017). Os espasmos musculares prolongados provocam distonias e posturas anormais, coreia, balismo e movimentos irregulares, estes são resultados da inibição dos disparos para substância negra/ globo pálido interno (LANCIEGO; LUQUIM; OBESO, 2012).

Inicialmente aparecem os tremores em uma das mãos, micrografia, complexidade em movimentos finos que exigem controle e destreza, no entanto, apresenta atenuação dos tremores nos movimentos voluntários, como esticar os braços (BRANDAO; ARAÚJO; COIMBRA, 2015; MONTEIRO, 2010).

A progressão da DP leva para piora da marcha, a rigidez muscular provoca uma contração dos músculos agonistas e antagonistas estabelecendo uma camptocormia (postura em flexão de tronco) com anteriorização da cabeça,hipercifose, flexão de joelhos

com consequente alteração do centro da gravidade que se evidencia no ortostatismo e cede no decúbito dorsal. Há dificuldade na mobilidade articular principalmente na rotação de tronco, os ajustes axial e postural torna-se diminuídos, a deformidade axial denomina-se Síndrome de Pisa, ocorre uma flexão lateral distônica do tronco (ATTA et al., 2010; GONÇALVES; LEITE; PEREIRA, 2011; SOUZA et al., 2011). A flexão exagerada do pescoço (síndrome da cabeça caída) é o resultado da fraqueza muscular extensora do pescoço ou hipertonia da musculatura anterior de tronco (ROCHA, 2015).

A cadência manifesta-se em bloco de aspecto festinado – passos curtos, rápidos e arrastados -, sem participação dos braços (SOUZA et al., 2011), exibem dificuldade na relação espaço-temporal, maior tempo de apoio dos pés no chão com perda da pressão calcânhar-artelhos com colocação dos pés aplanado dificultando o caminhar sobre obstáculos, alterações do padrão postural, maior gasto energético durante a locomoção devido a uma menor contração de gastrocnêmio medial e maior ativação de tibial anterior, maior contração de antagonistas flexores plantares e dorso-flexores de tornozelo com ativação tônica ou contínua dos músculos dos membros inferiores (MONTEIRO et al., 2017). A marcha evidencia falhas na inicialização e manutenção da execução do movimento, congelamento e desequilíbrio subcortical. As alterações nociceptoras identificam-se em quase 50% dos parkinsonianos, no entanto 20% apresentam modificações primárias desse sintoma juntamente com as desordens motoras (ALVAREZ; GALLEGOS; GOMEZ, 2012).

O tremor no Parkinson tem início ao movimento e desaparece no sono ou relaxamento completo. O exacerbamento se dá em situações de estresse e na marcha, o punho se mostra em uma adução-abdução do polegar ou flexo- extensão dos dedos que realiza movimentos simultâneos de “contar moedas” (MASSANO, 2011)

Disartria hipocinética, discurso monótono, baixo tom e intensidade, consoantes imprecisas com pausas e prosódia pobre, hiponímia facial, diminuição do pestanejar, bradicinesia na deglutição e face em máscara são resultado de uma sequência de contrações da musculatura da respiração, laringe, faringe, palato, língua e lábios, são controlados pelo córtex motor (vias corticobulbares), sistema extrapiramidal e cerebelo. As modificações fisiológicas ocorrem devido à perda de dopamina no estriado com consequente lesão dos gânglios da base e núcleos do tronco encefálico. Dessa forma, a rigidez acomete o sistema fonatório junto com o ritmo de vibração das cordas vocais. A articulação temporomandibular e demais estruturas apresentam déficit de movimento, tornam-se lentos e incapaz de fechar completamente a cavidade oral (ALVAREZ; GALLEGOS; GOMEZ, 2012; COSTA et al., 2015; WERNECK, 2010).

Dificilmente o portador têm os sentidos afetados e raramente o intelecto. No entanto, o sistema nervoso autônomo apresenta disfunções na DP, como, alterações cardiovasculares, alterações do apetite, alteração do humor, sialorreia constante, dispneia, incontinência urinária, obstinação intestinal, impotência sexual, evoluindo com o estágio progressivo da doença (BRANDÃO; ARAÚJO; COIMBRA, 2015).

É evidente que o envelhecimento é um fator que piora o quadro clínico e acelera a progressão da doença. As diversas perdas motoras, a somatização das mesmas associadas à diminuição da atividade física, da densidade mineral óssea e da sarcopenia, favorece a instabilidade postural, prejudicam a independência e a qualidade de vida, gerando limitações e aumento do risco de acidentes (ATTA et al., 2010; LUNA, 2010; SOUSA, 2016).

IV. CONSIDERAÇÕES FINAIS

Frente à revisão bibliográfica realizada, podemos inferir que a doença de Parkinson é uma afecção neurodegenerativa multifatorial com depleção dos neurônios dopaminérgicos da substância negra. A diminuição da dopamina circulante provoca alterações químicas nas áreas motoras do córtex cerebral nas vias direta e indireta desajustando as conexões neurais das áreas motoras do lobo frontal.

Toda via, o retrocesso do aprendizado e da execução dos movimentos é caracterizado por lesões focais no córtex pré-frontal, circuitos fronto-estriatal, conexão entre lobo frontal e gânglios da base, justamente pela escassez de dopamina neuronal circulante, morte dos neurônios dopaminérgicos e presença de inclusão neurofibrilares nos neurônios sobreviventes, visto que, o aumento da acetilcolina circulante que se unem aos receptores muscarínicos exacerba os sinais clínicos, desempenhando papel primordial na polissintomatologia.

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Lumbago in Adolescents Revealing Type 1 Neurofibromatosis about a Presentation

By Halladain Mpung Mansoj, Anna Modji Basse, Adjaratou Dieynabou Sow & Moustapha Ndiaye

Abstract- Neurofibromatosis type 1 (NF1) is an inherited disease caused by pathogenic variants of the NF1 gene present on chromosome 17 is an autosomal dominant disease of which occurs de novo. The cardinal signs of NF1 are cafe-au-lait spots and cutaneous neurofibromas.

The ideal imaging is based on the realization of nuclear magnetic resonance imaging. The treatment is based on the surgical removal of the tumor but report recurrence and malignant transformation that requires radiotherapy.

Keywords: neurofibromatosis, lumbago.

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Lumbago in Adolescents Revealing Type 1 Neurofibromatosis about a Presentation

Halladain Mpung Mansoj ^α, Anna Modji Basse ^ο, Adjaratou Dieynabou Sow ^ρ & Moustapha Ndiaye ^ω

Abstract Neurofibromatosis type 1 (NF1) is an inherited disease caused by pathogenic variants of the NF1 gene present on chromosome 17 is an autosomal dominant disease of which occurs de novo . The cardinal signs of NF1 are cafe-au-lait spots and cutaneous neurofibromas.

The ideal imaging is based on the realization of nuclear magnetic resonance imaging. The treatment is based on the surgical removal of the tumor but report recurrence and malignant transformation that requires radiotherapy.

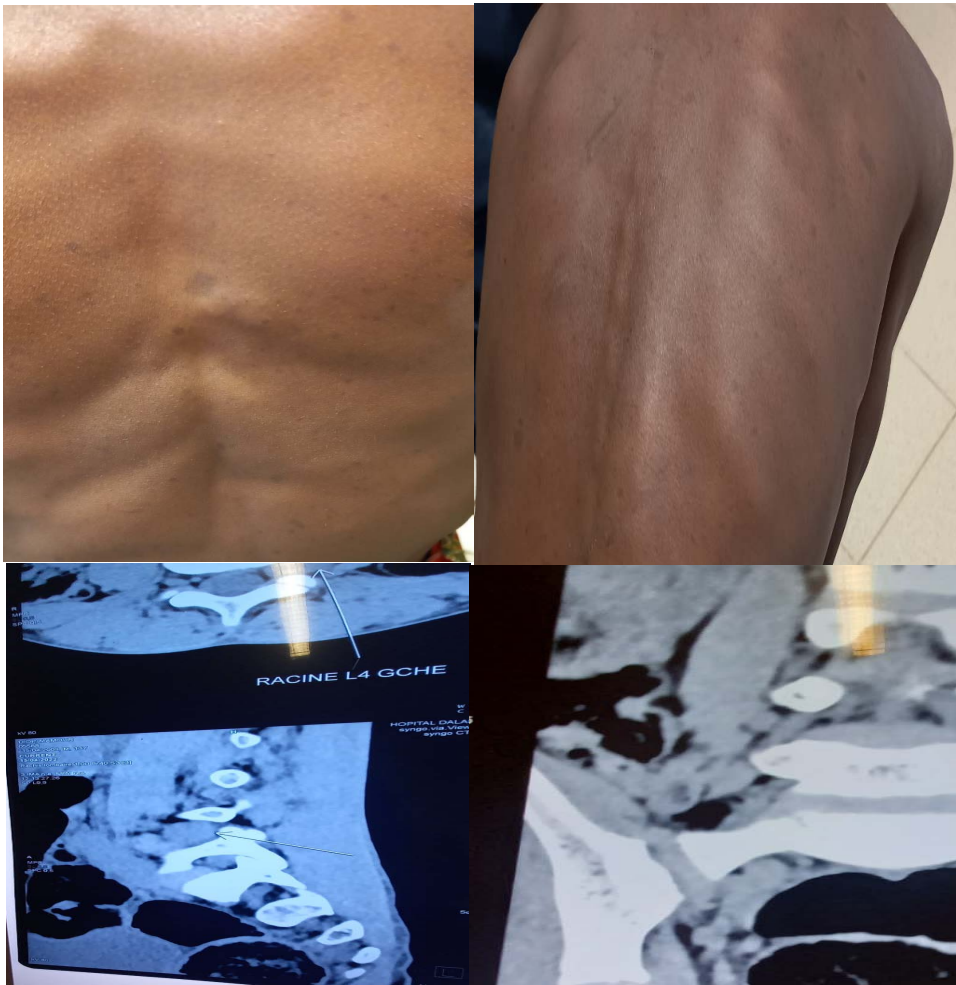
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I. INTRODUCTION

Neurofibromatosis type 1 (NF1) is an inherited disease caused by pathogenic variants of the NF1 gene present on chromosome 17 (1) The

approximate diagnostic prevalence is 1 in 3,000 to 4,000 people worldwide (2) [(3) It is an autosomal dominant disease of which 50% occurs de novo (4) . The cardinal signs of NF1 are café-au-lait spots and cutaneous neurofibromas .

Spinal lesions in NF1 are of particular importance because they can lead to distressing neurological deficit, pain, deformity, and functional disability (5). The lesions most often cited in the literature are dural ectasia, spinal deformities, spinal nerve root tumors and plexiform tumors,



Picture types coffee with milk

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CT lumbar spine

Hypertrophy of the left L4 root of 12.8 mm in probable conflict with the disc which could evoke neurofibromatosis.

II. DISCUSSION

Among the different variants of neurofibromatosis only for NF1 and NF2 National Institute of Health (NIH) (6) has established diagnostic guidelines as described in the literature.

The NF1 gene corresponds to chromosomal band 17q11.1.

NF2, which is much less common (incidence at birth approximately 1/33,000) and associated with significant morbidity and mortality due to the frequent location of lesions in the brain and spinal cord. The NF2 gene mutation corresponds to chromosomal band 22q12.6 The most important finding for the diagnosis of NF2 is the presence of bilateral schwannomas involving the eighth cranial nerve, with an incidence of approximately 95% of patients. People with NF2 also have an increased risk of developing single or multiple meningiomas and peripheral nerve schwannomas.

Genetic and molecular analysis performed on the tumors of these patients revealed that it is possible to name schwannomatosis as a distinct clinical and genetic syndrome. (7)

Schwannomatosis is therefore defined as an extremely rare tumor syndrome characterized by the presence of multiple schwannomas in the absence of typical signs of NF1 and NF2 syndromes. Typically, patients with schwannomatosis develop cranial, spinal, or peripheral nerve schwannomas but do not develop vestibular lesions (VS), typical of NF2. Schwannomas are benign, encapsulated, slowly growing peripheral nerve tumors. They account for approximately one-third of all primary benign spinal tumors (8). Our patient presented an isolated schwannoma of a lumbar nerve root, this isolated aspect was reported in the literature but also it is possible to find multiple locations involving several nerves (9) the presence of schwannomas can be responsible for a vertebral deformity such than scoliosis.

Nevertheless, the hypothesis of certain authors on an ectopic origin of CNS neuromas is validated by their encounter with intracerebral neuromas [(10) Since schwannomas localized in all parts of the CNS have been described, it is also probable that several mechanisms contribute to their development.

In the literature, the authors report erosion of the vertebral somas, mainly in the peduncles and the foramina. As well as surgical damage during tumor removal, can cause instability resulting in deformation of the corresponding spinal tract (11)

The tumor presents a ubiquitous evolution at the level of the spine (12) , even if a major incidence at the level of the cervical and lumbar tracts is reported

(13). In 2 cases reports a predilection to the cervical-lower tract and to the lumbosacral tract the passage is reported (14).

In one study, the highest incidence was in the lumbosacral tract (48.60%) with a peak between L1 and L3; the dorsal tract (33.96%) was second with a peak between T7 and T12; and the peak in the cervical tract (18.43%) was between C4 and C8. (15) The lumbar location is linked to the presence of a greater concentration of roots coming from the lumbar plexus) intended for the innervation of the lower limbs at these levels. Imaging itself, especially magnetic resonance imaging (MRI), allows for early diagnosis and more valid prognosis after surgical treatment (16) , (17)

Our patient did not have the financial means to carry out this imaging from which we contented ourselves with the lumbar scanner and on the basis of the anamnestic elements to establish the diagnosis. Treatment is based on surgical removal of the tumour;

Complete removal of the tumor is the ultimate goal; in fact, case reports, which confirmed recurrence after subtotal excision.

In one series, the authors encountered 3 cases of malignant neuroma, 1 of which was in NF2 at the cervical level in C1, and the patient died 20 days after the intervention. In another case, without Recklinghausen at C6, the patient died 2 months later of recurrence (18)].

In a third case of neuroma on D12, after excision, the patient underwent radiotherapy and died 2 years after the operation. According to Celli (19)], the preoperative symptoms, the preoperative neuroradiological diagnosis and the clinical signs are often not sufficient to suspect a malignant form of neuroma. Unlike cases of more malignant lesions, such as gliomas, complete removal of intramedullary neuromas is feasible and obviously the best clinical outcome and helps prevent possible recurrences.

III. CONCLUSION

Neurofibromatosis represents a multi-systemic disease whose clinical manifestation depends on the location

In the face of a clinical suspicion, always carry out a radiological and neurophysiological assessment which can guide the diagnosis.

The ideal imaging is based on the realization of nuclear magnetic resonance imaging.

The treatment is based on the surgical removal of the tumor but report recurrence and malignant transformation that requires radiotherapy.

IV. OBSERVATION

We present the case of a 14-year-old teenager who came for consultation for a progressive spinal deformity.

History of neurofibromatosis in his paternal grandfather.

General physical examination

A good general condition and good coloring of the mucous membranes

Presents hypochromic spots on the anterior and posterior thoraxes

Neurological examination shows an abolition of the left patellar reflex associated with low back pain without irradiation.

The scanner revealed hypertrophy of the left L4 root of 12.8 mm in probable conflict with the disc

The diagnosis of segmental type 1 neurofibromatosis was made in the face of this strictly unilateral attack, in a familial context and with systemic involvement.

Therapeutically, partial excision of the tumor volume. Histology confirmed the clinical absence of Lisch nodules, but did not show proliferation of neural crest cells in the choroid responsible for hyperplasia. Diagnosis of established neurofibromatosis types 1.

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Seizure, an Explosive effect of a Lightning Strike: A Case Report

By Abdellatif Chlouchi, Ilyass Hmadate, Khalil Chafi, Mustapha Rafai, Oussama Outaghyame, Abdellatif Benabbouha, Aziz Bazine & Abderrahmane Elhjouji

Abstract- Lightning strike injuries have a high morbidity rate because of critical alterations of the circulatory system, respiratory system, and central nervous system. Most lightning-related deaths occur immediately after injury because of arrhythmia or respiratory failure.

We describe the case of a patient who experienced a seizure and respiratory distress secondary to a lightning strike and how we obtained a return of spontaneous circulation and intact neurological survival.

We discuss furthermore the pathophysiology of lightning injuries, prognostic factors of favorable outcome of such uncommon accident.

Keywords: seizure, lightning, injury, (aeronautics), management, prevention.

GJMR-A Classification: DDC Code: 612.17 LCC Code: QP111.6



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Seizure, an Explosive effect of a Lightning Strike: A Case Report

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Abdellatif Benabbouha [§], Aziz Bazine ^x & Abderrahmane Elhjouji ^v

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I. INTRODUCTION

Lightning is an aerial electrical discharge, accompanied by a bright light (flash) and a violent detonation (thunder). Lightning is the passage of current through the human body or an animal. In general, a complete lightning strike lasts from 0.2 to 2 seconds.

The electrical parameters of the discharge are the intensity which can reach values higher than 200 000 amperes. The voltage seems to be in the range of 10 to 100 million volts. The temperature can reach 30,000 °C. [1]

A lightning strike can result in significant damage to the human body through three main mechanisms: cardiac arrest, inhibition of respiratory centers and brain damage.

We describe in this case report the circumstances of a lightning strike of a patient on the landing field of the airport of Bunia who sheltered under an airplane whose major clinical manifestation was a generalized seizure and we discuss the modalities of management and prevention of such a particular accident.

a) Clinical case

We received on Sunday the 22nd of January 2023 around 12H40 p.m., at MONUSCO Level 2 Hospital of

Bunia, Democratic Republic of Congo, Mr M.P a 38-year-old man with no medical history for a sudden loss of consciousness and seizures after a thunder lightning strike at 11 a.m. when working in maintenance of a plane at Bunia airport.

When it was raining heavily, the patient took shelter under the wing of the plane where a lightning strike occurred. The electric shock was transferred to the patient and he suddenly fell to the ground and presented a generalized seizure with loss of urine, which stopped spontaneously after thirty seconds.

The patient was immediately transferred to our hospital by the fire fighters team present at the scene.

Initial clinical assessment found an unconscious patient with a GCS of 9/15. Pupils were equal and reactive. There were no ongoing clinical seizures and there was no evidence of head trauma on clinical examination.

He otherwise presented with stertorous breathing, with desaturation at 82% on room air and polypnea at 35 cycles per minute, auscultation finds right ronchi with signs of pulmonary aspiration.

He was hemodynamically stable with blood pressure at 142/83 mmHg, and tachycardia at 126 bpm. The pulses were present and symmetrical, and cardiac auscultation was normal.

The abdomen was soft, there was no external burning and the rest of the clinical examination was without abnormalities, the temperature was 37°C and the capillary blood glucose was 1.6 g/l.

After conditioning and monitoring, the patient was placed in a half-seated position with oxygen therapy through a high concentration mask at 10 liters per minute and a peripheral venous line was taken with 500 ml of isotonic saline.

The patient became agitated which led us to administer 2 mg of Midazolam IV and analgesia with 1 g of Paracetamol in slow infusion.

The EKG was without abnormalities, with a regular sinus rhythm at 87 bpm without repolarization or conduction disorders. (Figure 1)

Chest X-ray showed a small basal alveolar image on the right, consistent with gastric aspiration. (Figure 2)

An abdominopelvic ultrasound in search of a peritoneal effusion or a lesion of a solid organ was without abnormalities.

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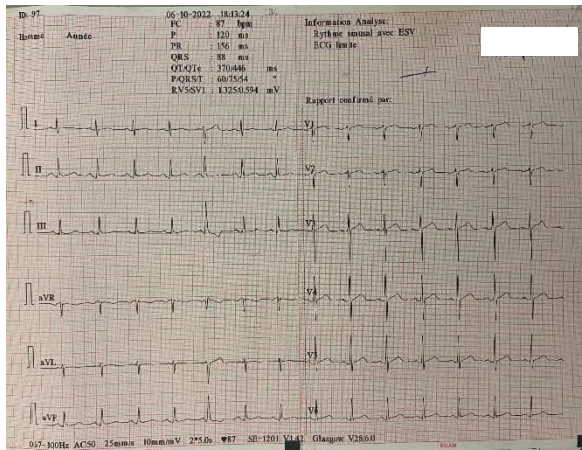


Figure 1: Normal EKG of the Patient

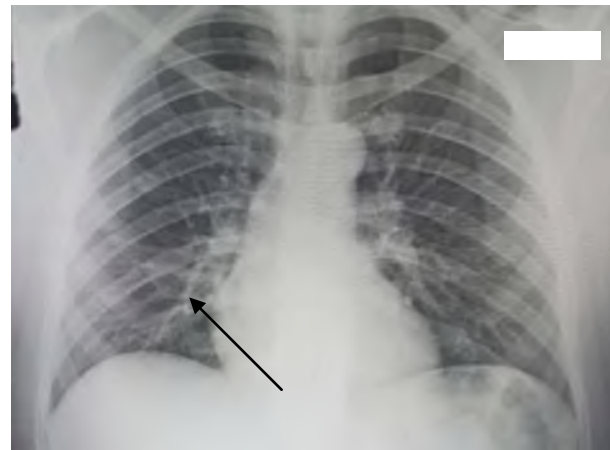


Figure 2: Right basal Image on Chest X-Ray

The patient became increasingly calm and cooperative with total amnesia of the circumstances of the accident.

Blood exams showed hemoglobin at 16.4 g/dl, hematocrit at 49.2%, white blood cells at 11400/ml and platelets at 207000/ml.

The blood ionogram showed a Natremia of 133 mmol/l, a Kalemia of 3.7 mmol/l, a Chloremia of 111 mmol/l, a Bicarbonate of 24 mmol/l and a Phosphorus of 5.5 mg/l.

Blood glucose was = 1.1 g/l, urea 0.7 g/l and creatinine 11mg/l.

The hepatic enzymes was normal with AST at 61 IU/l, ALT at 30 IU/l, total Bilirubin at 14 mg/l, PAL at 70 IU/l, GGT at 67 IU/l and Albumin at 32g/l.

Muscle enzymes and lipasemia were normal.

Troponin was normal at 0.5 ng/ml.

A computerized tomography scan of the head was obtained and was normal, including normal gray-white differentiation, no hemorrhage, or mass effect.

He had pain and paresthesias in both lower limbs, which is why he was put under paracetamol analgesia and under amoxicillin clavulanic acid for aspiration.

After few hours, he was fully conscious and was able to eat and drink. The patient was discharged from the hospital on the third day. He was able to ambulate and had a normal neurological examination and normal mental status. He was awake and able to follow commands.

The patient was referred to a higher level hospital in the capital Kinshasa for further examination and psychological assessment.

II. DISCUSSION

Lightning strikes are a serious accident with a high morbidity and mortality rate. If one out of three

lightning victims dies, seven out of ten survivors have permanent repercussions that are often disabling. However, evidence of lightning injuries is restricted to case reports and nonsystematic reviews. [1]

A distinction must be made between the direct and indirect effects of lightning strikes. Direct effects are due to the release of thermal, light and sound energy but differ according to the type of lightning strike. [2]

When the current crosses the heart, it can cause cardiac arrest by asystole or ventricular fibrillation, myocardial ischemia or rhythm disorders. The danger depends on the intensity of the current, its duration and the time of passage in relation to the cardiac cycle.

When the current crosses nerve structures, it can cause consciousness and neurovegetative disorders.

This can lead to deep coma and immediate or delayed respiratory arrest, from minutes to hours. [3]

The frequency of cephalic burns attests to the frequency of cephalic passage of the current.

The neurological manifestations of a lightning strike are extremely varied. They can be serious cerebral lesions such as cerebral haemorrhages with extradural, subdural or intracranial haematoma, secondary to projections and to the effects of the "blast" on the brain, or temporary symptoms such as loss of consciousness, anterograde amnesia or also anxiety, agitation, irritability, apathy, headaches, cranial nerve damage, paresis or transient paralysis. These symptoms disappear within hours or months. [4]

The respiratory distress is due to the sideration of the respiratory centers by the passage of the current.

The passage of current can also cause electrothermal burns. The muscular masses and the vascular-nervous axes are particularly exposed. The electrical resistance of the latter being low, the intensity delivered locally is high.

For indirect effects, thermal and mechanical energy is released near the lightning channel producing

the same effects as an explosion: burns and/or barotrauma.

It is also necessary to point out the post-traumatic stress disorder, sometimes very disabling.

From an electrical point of view, when the discharge crosses the body and the intensity reaches a peak of about 1,000 amps, the potential difference between the head and the feet reaches 300,000 volts. The total duration of a lightning strike is on average 10 to 20 milliseconds. The bypass arc and the brevity of the electrification have a life-saving effect. [5]

In our case, the major clinical manifestation was seizures followed by a post-critical coma after transfer of the electric current through the cephalic extremity of the patient who sheltered directly below the aircraft's wing.

All airplanes are equipped with lightning protection devices that discharge any electrical build-up conducting the current through the metal hull to the outside which transmitted it to the patient in our case. [6]

The management of these victims is not specific but all aspects of management must be considered. Consequently, the initial clinical assessment must be exhaustive, and the management complete.

The lightning victim is often electrically shocked, burned, injured, possibly polyfractured or even polytraumatized, sometimes hypothermic and psychologically shocked. [7]

The treatment of each injury is essentially symptomatic. The management of a cardiac arrest is not specific. Cardiopulmonary resuscitation is usually prolonged, especially if it could be initiated early, because of the good prognosis of cardiac arrest in these circumstances and the frequent hypothermia. [8]

In our patient, the management consisted of treatment of the seizure and management of respiratory distress and recovery was rapid and complete.

Prevention remains the most effective way to fight against these serious accidents, especially in tropical regions particularly exposed to a high frequency of thunderstorms. The most effective means of this prevention is to take refuge as soon as possible in a raise awareness of the potential dangers of lightning. [9]

III. CONCLUSION

Lightning strikes have high morbidity and mortality rates. However, evidence of lightning injuries is restricted to case reports and series and nonsystematic reviews.

Most damage from lightning injuries is cardiovascular and neurological, although an individual can experience complications with any of their vital functions.

It is vital that every lightning strike patient is treated according to standard trauma guide- lines, with

a specific focus on the possible sequel of lightning injuries.

All health-care professionals should acknowledge the risks and particularities of the lightning strike injuries to optimize the care and outcomes of these patients.

Declarations of Competing Interest

None.

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Acknowledgments

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Authors can submit papers and articles in an acceptable file format: MS Word (doc, docx), LaTeX (.tex, .zip or .rar including all of your files), Adobe PDF (.pdf), rich text format (.rtf), simple text document (.txt), Open Document Text (.odt), and Apple Pages (.pages). Our professional layout editors will format the entire paper according to our official guidelines. This is one of the highlights of publishing with Global Journals—authors should not be concerned about the formatting of their paper. Global Journals accepts articles and manuscripts in every major language, be it Spanish, Chinese, Japanese, Portuguese, Russian, French, German, Dutch, Italian, Greek, or any other national language, but the title, subtitle, and abstract should be in English. This will facilitate indexing and the pre-peer review process.

The following is the official style and template developed for publication of a research paper. Authors are not required to follow this style during the submission of the paper. It is just for reference purposes.



Manuscript Style Instruction (Optional)

- Microsoft Word Document Setting Instructions.
- Font type of all text should be Swis721 Lt BT.
- Page size: 8.27" x 11", left margin: 0.65, right margin: 0.65, bottom margin: 0.75.
- Paper title should be in one column of font size 24.
- Author name in font size of 11 in one column.
- Abstract: font size 9 with the word "Abstract" in bold italics.
- Main text: font size 10 with two justified columns.
- Two columns with equal column width of 3.38 and spacing of 0.2.
- First character must be three lines drop-capped.
- The paragraph before spacing of 1 pt and after of 0 pt.
- Line spacing of 1 pt.
- Large images must be in one column.
- The names of first main headings (Heading 1) must be in Roman font, capital letters, and font size of 10.
- The names of second main headings (Heading 2) must not include numbers and must be in italics with a font size of 10.

Structure and Format of Manuscript

The recommended size of an original research paper is under 15,000 words and review papers under 7,000 words. Research articles should be less than 10,000 words. Research papers are usually longer than review papers. Review papers are reports of significant research (typically less than 7,000 words, including tables, figures, and references)

A research paper must include:

- a) A title which should be relevant to the theme of the paper.
- b) A summary, known as an abstract (less than 150 words), containing the major results and conclusions.
- c) Up to 10 keywords that precisely identify the paper's subject, purpose, and focus.
- d) An introduction, giving fundamental background objectives.
- e) Resources and techniques with sufficient complete experimental details (wherever possible by reference) to permit repetition, sources of information must be given, and numerical methods must be specified by reference.
- f) Results which should be presented concisely by well-designed tables and figures.
- g) Suitable statistical data should also be given.
- h) All data must have been gathered with attention to numerical detail in the planning stage.

Design has been recognized to be essential to experiments for a considerable time, and the editor has decided that any paper that appears not to have adequate numerical treatments of the data will be returned unrefereed.

- i) Discussion should cover implications and consequences and not just recapitulate the results; conclusions should also be summarized.
- j) There should be brief acknowledgments.
- k) There ought to be references in the conventional format. Global Journals recommends APA format.

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The Editorial Board reserves the right to make literary corrections and suggestions to improve brevity.



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It is necessary that authors take care in submitting a manuscript that is written in simple language and adheres to published guidelines.

All manuscripts submitted to Global Journals should include:

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The title page must carry an informative title that reflects the content, a running title (less than 45 characters together with spaces), names of the authors and co-authors, and the place(s) where the work was carried out.

Author details

The full postal address of any related author(s) must be specified.

Abstract

The abstract is the foundation of the research paper. It should be clear and concise and must contain the objective of the paper and inferences drawn. It is advised to not include big mathematical equations or complicated jargon.

Many researchers searching for information online will use search engines such as Google, Yahoo or others. By optimizing your paper for search engines, you will amplify the chance of someone finding it. In turn, this will make it more likely to be viewed and cited in further works. Global Journals has compiled these guidelines to facilitate you to maximize the web-friendliness of the most public part of your paper.

Keywords

A major lynchpin of research work for the writing of research papers is the keyword search, which one will employ to find both library and internet resources. Up to eleven keywords or very brief phrases have to be given to help data retrieval, mining, and indexing.

One must be persistent and creative in using keywords. An effective keyword search requires a strategy: planning of a list of possible keywords and phrases to try.

Choice of the main keywords is the first tool of writing a research paper. Research paper writing is an art. Keyword search should be as strategic as possible.

One should start brainstorming lists of potential keywords before even beginning searching. Think about the most important concepts related to research work. Ask, "What words would a source have to include to be truly valuable in a research paper?" Then consider synonyms for the important words.

It may take the discovery of only one important paper to steer in the right keyword direction because, in most databases, the keywords under which a research paper is abstracted are listed with the paper.

Numerical Methods

Numerical methods used should be transparent and, where appropriate, supported by references.

Abbreviations

Authors must list all the abbreviations used in the paper at the end of the paper or in a separate table before using them.

Formulas and equations

Authors are advised to submit any mathematical equation using either MathJax, KaTeX, or LaTeX, or in a very high-quality image.

Tables, Figures, and Figure Legends

Tables: Tables should be cautiously designed, uncrowned, and include only essential data. Each must have an Arabic number, e.g., Table 4, a self-explanatory caption, and be on a separate sheet. Authors must submit tables in an editable format and not as images. References to these tables (if any) must be mentioned accurately.



Figures

Figures are supposed to be submitted as separate files. Always include a citation in the text for each figure using Arabic numbers, e.g., Fig. 4. Artwork must be submitted online in vector electronic form or by emailing it.

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Although low-quality images are sufficient for review purposes, print publication requires high-quality images to prevent the final product being blurred or fuzzy. Submit (possibly by e-mail) EPS (line art) or TIFF (halftone/ photographs) files only. MS PowerPoint and Word Graphics are unsuitable for printed pictures. Avoid using pixel-oriented software. Scans (TIFF only) should have a resolution of at least 350 dpi (halftone) or 700 to 1100 dpi (line drawings). Please give the data for figures in black and white or submit a Color Work Agreement form. EPS files must be saved with fonts embedded (and with a TIFF preview, if possible).

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TIPS FOR WRITING A GOOD QUALITY MEDICAL RESEARCH PAPER

1. Choosing the topic: In most cases, the topic is selected by the interests of the author, but it can also be suggested by the guides. You can have several topics, and then judge which you are most comfortable with. This may be done by asking several questions of yourself, like "Will I be able to carry out a search in this area? Will I find all necessary resources to accomplish the search? Will I be able to find all information in this field area?" If the answer to this type of question is "yes," then you ought to choose that topic. In most cases, you may have to conduct surveys and visit several places. Also, you might have to do a lot of work to find all the rises and falls of the various data on that subject. Sometimes, detailed information plays a vital role, instead of short information. Evaluators are human: The first thing to remember is that evaluators are also human beings. They are not only meant for rejecting a paper. They are here to evaluate your paper. So present your best aspect.

2. Think like evaluators: If you are in confusion or getting demotivated because your paper may not be accepted by the evaluators, then think, and try to evaluate your paper like an evaluator. Try to understand what an evaluator wants in your research paper, and you will automatically have your answer. Make blueprints of paper: The outline is the plan or framework that will help you to arrange your thoughts. It will make your paper logical. But remember that all points of your outline must be related to the topic you have chosen.

3. Ask your guides: If you are having any difficulty with your research, then do not hesitate to share your difficulty with your guide (if you have one). They will surely help you out and resolve your doubts. If you can't clarify what exactly you require for your work, then ask your supervisor to help you with an alternative. He or she might also provide you with a list of essential readings.

4. Use of computer is recommended: As you are doing research in the field of medical research then this point is quite obvious. Use right software: Always use good quality software packages. If you are not capable of judging good software, then you can lose the quality of your paper unknowingly. There are various programs available to help you which you can get through the internet.

5. Use the internet for help: An excellent start for your paper is using Google. It is a wondrous search engine, where you can have your doubts resolved. You may also read some answers for the frequent question of how to write your research paper or find a model research paper. You can download books from the internet. If you have all the required books, place importance on reading, selecting, and analyzing the specified information. Then sketch out your research paper. Use big pictures: You may use encyclopedias like Wikipedia to get pictures with the best resolution. At Global Journals, you should strictly follow here.



6. Bookmarks are useful: When you read any book or magazine, you generally use bookmarks, right? It is a good habit which helps to not lose your continuity. You should always use bookmarks while searching on the internet also, which will make your search easier.

7. Revise what you wrote: When you write anything, always read it, summarize it, and then finalize it.

8. Make every effort: Make every effort to mention what you are going to write in your paper. That means always have a good start. Try to mention everything in the introduction—what is the need for a particular research paper. Polish your work with good writing skills and always give an evaluator what he wants. Make backups: When you are going to do any important thing like making a research paper, you should always have backup copies of it either on your computer or on paper. This protects you from losing any portion of your important data.

9. Produce good diagrams of your own: Always try to include good charts or diagrams in your paper to improve quality. Using several unnecessary diagrams will degrade the quality of your paper by creating a hodgepodge. So always try to include diagrams which were made by you to improve the readability of your paper. Use of direct quotes: When you do research relevant to literature, history, or current affairs, then use of quotes becomes essential, but if the study is relevant to science, use of quotes is not preferable.

10. Use proper verb tense: Use proper verb tenses in your paper. Use past tense to present those events that have happened. Use present tense to indicate events that are going on. Use future tense to indicate events that will happen in the future. Use of wrong tenses will confuse the evaluator. Avoid sentences that are incomplete.

11. Pick a good study spot: Always try to pick a spot for your research which is quiet. Not every spot is good for studying.

12. Know what you know: Always try to know what you know by making objectives, otherwise you will be confused and unable to achieve your target.

13. Use good grammar: Always use good grammar and words that will have a positive impact on the evaluator; use of good vocabulary does not mean using tough words which the evaluator has to find in a dictionary. Do not fragment sentences. Eliminate one-word sentences. Do not ever use a big word when a smaller one would suffice.

Verbs have to be in agreement with their subjects. In a research paper, do not start sentences with conjunctions or finish them with prepositions. When writing formally, it is advisable to never split an infinitive because someone will (wrongly) complain. Avoid clichés like a disease. Always shun irritating alliteration. Use language which is simple and straightforward. Put together a neat summary.

14. Arrangement of information: Each section of the main body should start with an opening sentence, and there should be a changeover at the end of the section. Give only valid and powerful arguments for your topic. You may also maintain your arguments with records.

15. Never start at the last minute: Always allow enough time for research work. Leaving everything to the last minute will degrade your paper and spoil your work.

16. Multitasking in research is not good: Doing several things at the same time is a bad habit in the case of research activity. Research is an area where everything has a particular time slot. Divide your research work into parts, and do a particular part in a particular time slot.

17. Never copy others' work: Never copy others' work and give it your name because if the evaluator has seen it anywhere, you will be in trouble. Take proper rest and food: No matter how many hours you spend on your research activity, if you are not taking care of your health, then all your efforts will have been in vain. For quality research, take proper rest and food.

18. Go to seminars: Attend seminars if the topic is relevant to your research area. Utilize all your resources.

19. Refresh your mind after intervals: Try to give your mind a rest by listening to soft music or sleeping in intervals. This will also improve your memory. Acquire colleagues: Always try to acquire colleagues. No matter how sharp you are, if you acquire colleagues, they can give you ideas which will be helpful to your research.



20. Think technically: Always think technically. If anything happens, search for its reasons, benefits, and demerits. Think and then print: When you go to print your paper, check that tables are not split, headings are not detached from their descriptions, and page sequence is maintained.

21. Adding unnecessary information: Do not add unnecessary information like "I have used MS Excel to draw graphs." Irrelevant and inappropriate material is superfluous. Foreign terminology and phrases are not apropos. One should never take a broad view. Analogy is like feathers on a snake. Use words properly, regardless of how others use them. Remove quotations. Puns are for kids, not grunt readers. Never oversimplify: When adding material to your research paper, never go for oversimplification; this will definitely irritate the evaluator. Be specific. Never use rhythmic redundancies. Contractions shouldn't be used in a research paper. Comparisons are as terrible as clichés. Give up ampersands, abbreviations, and so on. Remove commas that are not necessary. Parenthetical words should be between brackets or commas. Understatement is always the best way to put forward earth-shaking thoughts. Give a detailed literary review.

22. Report concluded results: Use concluded results. From raw data, filter the results, and then conclude your studies based on measurements and observations taken. An appropriate number of decimal places should be used. Parenthetical remarks are prohibited here. Proofread carefully at the final stage. At the end, give an outline to your arguments. Spot perspectives of further study of the subject. Justify your conclusion at the bottom sufficiently, which will probably include examples.

23. Upon conclusion: Once you have concluded your research, the next most important step is to present your findings. Presentation is extremely important as it is the definite medium through which your research is going to be in print for the rest of the crowd. Care should be taken to categorize your thoughts well and present them in a logical and neat manner. A good quality research paper format is essential because it serves to highlight your research paper and bring to light all necessary aspects of your research.

INFORMAL GUIDELINES OF RESEARCH PAPER WRITING

Key points to remember:

- Submit all work in its final form.
- Write your paper in the form which is presented in the guidelines using the template.
- Please note the criteria peer reviewers will use for grading the final paper.

Final points:

One purpose of organizing a research paper is to let people interpret your efforts selectively. The journal requires the following sections, submitted in the order listed, with each section starting on a new page:

The introduction: This will be compiled from reference matter and reflect the design processes or outline of basis that directed you to make a study. As you carry out the process of study, the method and process section will be constructed like that. The results segment will show related statistics in nearly sequential order and direct reviewers to similar intellectual paths throughout the data that you gathered to carry out your study.

The discussion section:

This will provide understanding of the data and projections as to the implications of the results. The use of good quality references throughout the paper will give the effort trustworthiness by representing an alertness to prior workings.

Writing a research paper is not an easy job, no matter how trouble-free the actual research or concept. Practice, excellent preparation, and controlled record-keeping are the only means to make straightforward progression.

General style:

Specific editorial column necessities for compliance of a manuscript will always take over from directions in these general guidelines.

To make a paper clear: Adhere to recommended page limits.



Mistakes to avoid:

- Insertion of a title at the foot of a page with subsequent text on the next page.
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- Submitting a manuscript with pages out of sequence.
- In every section of your document, use standard writing style, including articles ("a" and "the").
- Keep paying attention to the topic of the paper.
- Use paragraphs to split each significant point (excluding the abstract).
- Align the primary line of each section.
- Present your points in sound order.
- Use present tense to report well-accepted matters.
- Use past tense to describe specific results.
- Do not use familiar wording; don't address the reviewer directly. Don't use slang or superlatives.
- Avoid use of extra pictures—include only those figures essential to presenting results.

Title page:

Choose a revealing title. It should be short and include the name(s) and address(es) of all authors. It should not have acronyms or abbreviations or exceed two printed lines.

Abstract: This summary should be two hundred words or less. It should clearly and briefly explain the key findings reported in the manuscript and must have precise statistics. It should not have acronyms or abbreviations. It should be logical in itself. Do not cite references at this point.

An abstract is a brief, distinct paragraph summary of finished work or work in development. In a minute or less, a reviewer can be taught the foundation behind the study, common approaches to the problem, relevant results, and significant conclusions or new questions.

Write your summary when your paper is completed because how can you write the summary of anything which is not yet written? Wealth of terminology is very essential in abstract. Use comprehensive sentences, and do not sacrifice readability for brevity; you can maintain it succinctly by phrasing sentences so that they provide more than a lone rationale. The author can at this moment go straight to shortening the outcome. Sum up the study with the subsequent elements in any summary. Try to limit the initial two items to no more than one line each.

Reason for writing the article—theory, overall issue, purpose.

- Fundamental goal.
- To-the-point depiction of the research.
- Consequences, including definite statistics—if the consequences are quantitative in nature, account for this; results of any numerical analysis should be reported. Significant conclusions or questions that emerge from the research.

Approach:

- Single section and succinct.
- An outline of the job done is always written in past tense.
- Concentrate on shortening results—limit background information to a verdict or two.
- Exact spelling, clarity of sentences and phrases, and appropriate reporting of quantities (proper units, important statistics) are just as significant in an abstract as they are anywhere else.

Introduction:

The introduction should "introduce" the manuscript. The reviewer should be presented with sufficient background information to be capable of comprehending and calculating the purpose of your study without having to refer to other works. The basis for the study should be offered. Give the most important references, but avoid making a comprehensive appraisal of the topic. Describe the problem visibly. If the problem is not acknowledged in a logical, reasonable way, the reviewer will give no attention to your results. Speak in common terms about techniques used to explain the problem, if needed, but do not present any particulars about the protocols here.



The following approach can create a valuable beginning:

- Explain the value (significance) of the study.
- Defend the model—why did you employ this particular system or method? What is its compensation? Remark upon its appropriateness from an abstract point of view as well as pointing out sensible reasons for using it.
- Present a justification. State your particular theory(-ies) or aim(s), and describe the logic that led you to choose them.
- Briefly explain the study's tentative purpose and how it meets the declared objectives.

Approach:

Use past tense except for when referring to recognized facts. After all, the manuscript will be submitted after the entire job is done. Sort out your thoughts; manufacture one key point for every section. If you make the four points listed above, you will need at least four paragraphs. Present surrounding information only when it is necessary to support a situation. The reviewer does not desire to read everything you know about a topic. Shape the theory specifically—do not take a broad view.

As always, give awareness to spelling, simplicity, and correctness of sentences and phrases.

Procedures (methods and materials):

This part is supposed to be the easiest to carve if you have good skills. A soundly written procedures segment allows a capable scientist to replicate your results. Present precise information about your supplies. The suppliers and clarity of reagents can be helpful bits of information. Present methods in sequential order, but linked methodologies can be grouped as a segment. Be concise when relating the protocols. Attempt to give the least amount of information that would permit another capable scientist to replicate your outcome, but be cautious that vital information is integrated. The use of subheadings is suggested and ought to be synchronized with the results section.

When a technique is used that has been well-described in another section, mention the specific item describing the way, but draw the basic principle while stating the situation. The purpose is to show all particular resources and broad procedures so that another person may use some or all of the methods in one more study or referee the scientific value of your work. It is not to be a step-by-step report of the whole thing you did, nor is a methods section a set of orders.

Materials:

Materials may be reported in part of a section or else they may be recognized along with your measures.

Methods:

- Report the method and not the particulars of each process that engaged the same methodology.
- Describe the method entirely.
- To be succinct, present methods under headings dedicated to specific dealings or groups of measures.
- Simplify—detail how procedures were completed, not how they were performed on a particular day.
- If well-known procedures were used, account for the procedure by name, possibly with a reference, and that's all.

Approach:

It is embarrassing to use vigorous voice when documenting methods without using first person, which would focus the reviewer's interest on the researcher rather than the job. As a result, when writing up the methods, most authors use third person passive voice.

Use standard style in this and every other part of the paper—avoid familiar lists, and use full sentences.

What to keep away from:

- Resources and methods are not a set of information.
- Skip all descriptive information and surroundings—save it for the argument.
- Leave out information that is immaterial to a third party.



Results:

The principle of a results segment is to present and demonstrate your conclusion. Create this part as entirely objective details of the outcome, and save all understanding for the discussion.

The page length of this segment is set by the sum and types of data to be reported. Use statistics and tables, if suitable, to present consequences most efficiently.

You must clearly differentiate material which would usually be incorporated in a study editorial from any unprocessed data or additional appendix matter that would not be available. In fact, such matters should not be submitted at all except if requested by the instructor.

Content:

- Sum up your conclusions in text and demonstrate them, if suitable, with figures and tables.
- In the manuscript, explain each of your consequences, and point the reader to remarks that are most appropriate.
- Present a background, such as by describing the question that was addressed by creation of an exacting study.
- Explain results of control experiments and give remarks that are not accessible in a prescribed figure or table, if appropriate.
- Examine your data, then prepare the analyzed (transformed) data in the form of a figure (graph), table, or manuscript.

What to stay away from:

- Do not discuss or infer your outcome, report surrounding information, or try to explain anything.
- Do not include raw data or intermediate calculations in a research manuscript.
- Do not present similar data more than once.
- A manuscript should complement any figures or tables, not duplicate information.
- Never confuse figures with tables—there is a difference.

Approach:

As always, use past tense when you submit your results, and put the whole thing in a reasonable order.

Put figures and tables, appropriately numbered, in order at the end of the report.

If you desire, you may place your figures and tables properly within the text of your results section.

Figures and tables:

If you put figures and tables at the end of some details, make certain that they are visibly distinguished from any attached appendix materials, such as raw facts. Whatever the position, each table must be titled, numbered one after the other, and include a heading. All figures and tables must be divided from the text.

Discussion:

The discussion is expected to be the trickiest segment to write. A lot of papers submitted to the journal are discarded based on problems with the discussion. There is no rule for how long an argument should be.

Position your understanding of the outcome visibly to lead the reviewer through your conclusions, and then finish the paper with a summing up of the implications of the study. The purpose here is to offer an understanding of your results and support all of your conclusions, using facts from your research and generally accepted information, if suitable. The implication of results should be fully described.

Infer your data in the conversation in suitable depth. This means that when you clarify an observable fact, you must explain mechanisms that may account for the observation. If your results vary from your prospect, make clear why that may have happened. If your results agree, then explain the theory that the proof supported. It is never suitable to just state that the data approved the prospect, and let it drop at that. Make a decision as to whether each premise is supported or discarded or if you cannot make a conclusion with assurance. Do not just dismiss a study or part of a study as "uncertain."



Research papers are not acknowledged if the work is imperfect. Draw what conclusions you can based upon the results that you have, and take care of the study as a finished work.

- You may propose future guidelines, such as how an experiment might be personalized to accomplish a new idea.
- Give details of all of your remarks as much as possible, focusing on mechanisms.
- Make a decision as to whether the tentative design sufficiently addressed the theory and whether or not it was correctly restricted. Try to present substitute explanations if they are sensible alternatives.
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- Recommendations for detailed papers will offer supplementary suggestions.

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<i>References</i>	Complete and correct format, well organized	Beside the point, Incomplete	Wrong format and structuring



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