Statistical Trends in Family Medicine Journals

Original Article

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Background: This study proposed a desirable direction for the future development of the Korean Journal of Family Medicine (KJFM) by comparing with the overseas SCI journals, Family Medicine (FM) and The Journal of Family Practice (JFP) based on the statistical viewpoints.

Methods: All of the original articles published in KJFM from January 1981 to June 2011, FM from January 1998 to June 2011, and JFP from January 1978 to June 2011, were reviewed and compared in terms of content, data size, research design, and statistical method.

Results: Of 3,226 total original articles, KJFM published 1,549, FM 322, and JFP 1,355, respectively. Both JFP and KJFM mainly focused on biomedical topics (67.2% and 61.7%), while FM focused on education (55.9%). Most of the studies in three journals used the data size of between 100 to 300 cases. The most frequently used research design was cross-sectional, FM 66.8%, JFP 58.4%, and KJFM 72.4%, respectively. The statistical methods in KJFM were gradually diversified.

Conclusion: The quality of the original articles in KJFM has been improved over the years, but still has conducted based on the relatively weak research designs. Under the circumstances that the higher ranked SCI journals demand the prospective design and large size of data, and most researchers in Korea could not use the large scaled prospective data, we need to collaborate to accumulate the small sized data sets and try to make a registry. More refined statistical method such as a propensity score matching analysis for retrospective data could be an alternative.

Keywords: Family Medicine Journals; Content Area; Data Size; Research Design; Statistical Method; Statistical Trend

INTRODUCTION

Korean Journal of Family Medicine (KJFM) is a measure to evaluate the academic results of family medicine in Korea and

plays an important role in leading family medicine. Therefore, it is important to compare the trends of the contents and research designs used in KJFM with those in overseas SCI family medicine journals to understand the current state of KJFM. And a suggestion for a desirable direction also needed to accomplish the academic leap for family medicine.

There have been similar studies on the family medicine journals. Fromm and Snyder[1] analyzed the articles in the Journal of Family Practice (JFP) from January 1982 to December 1983 according to research design and statistical method, and concluded that most of the articles used the descriptive statistics and cross-sectional design. In Korea, Yu et al.[2] compared there search design, content, quality, and statistical method used in KJFM and JFP from 1981 to 1992, and emphasized that the

quality of the articles in KJFM was lower than those in JFP; however they also stated that the quality level of the studies has gradually improved. Seo et al.[3] analyzed the research design, way of data collection, and statistical method in KJFM from November 1980 to June 1989, and described that 95.2% of the original articles used only descriptive statistics, 54.2% of the original articles did not use any statistical method nor mention about the statistical procedure.

KJFM has reached maturity and has been active in not only in the medical area but also in the fields of education and health

Table 1. Category of major content area.

Category	Content	Content detail
Biomedical	Common medical problem	Overall medical problem of patient's disease
	Geriatrics	Diagnosis and treatment of disease Affecting older people
	Epidemiology	Occurrence, transmission and control of epidemic disease
	Procedure	Surgical procedure
	Laboratory medicine	It is to get information about the health of a patient as clinical tests for medical purposes
	Smoking	Pain and disease related to smoke
	Obesity	Pain and disease related to obesity
Biopsychosocial	Stress	Pain and disease related to stress
	Doctor-patient relationship	Psychological relationship between doctor and patient
	Death and dying	Worry and illness of the mind about death
	Psychotherapy	Psychological methods in treating people who are mentally ill
	Chemical dependency	It is hard to control, even so it must be controlled
	Ethics	Moral value of human conduct and of the rules and principles
	Compliance	A patient's adherence to a recommended course of treatment
	Family dynamics	Diversity, tradition, love, money, culture, and change related to patient's family
	Quality of life	A degree of satisfaction of patient's life
Education	General medical education	Medical education for the general public
	Resident education	Medical education for the resident
	Undergraduate education	Education of medical student
	Faculty development	Education of general student
	Research methodology	Details needed to research
	Patient education	Medical education for patients
Health service	General service	Common service of medical institution
	Health maintenance	Service and try for patient's health maintenance
	Cost-effectiveness	Medical expense insurance and overallmedical fee
	Clinical decision making	Patient's decision participated to the clinical trial
	Continuity of care	Treatment continuity of patient
	Quality of care	Quality of medical institution's treatment
	Institution management	Overall management of medical institution
	Reimbursement	Insurance and medicare reimbursement
	Refer and consultation	Doctor and medical team consultation of common disease

service. And there is more awareness of the fact that the study of family medicine is a necessary element for the development of family medicine as a professional preliminary medical treatment. Therefore, the need for comparing the KJFM, which reflects 30 years of academic outcomes, with overseas SCI journals of family medicine and providing the proper direction for the future development of KJFM is required.

METHODS

1. Subjects

The subjects of the analysis were 3,226 original articles from three family medicine journals; 1,549 in KJFM from January 1981 to June 2011, 322 in Family Medicine (FM) from January 1998 to June 2011, and 1,355 in JFP from January 1978 to June 2011.

2. Methods

Following criteria were used to classify the articles.

1) Content

Referring to the method used when Shank[4] categorized

research fields of family medicine articles, contents were categorized into biomedical, biopsychosocial, education, and health service as shown in Table 1.

2) Data size

The data size was classified as under 50, 50−100, 100− 300, 300−500, 500−1,000, 1,000−3,000, 3,000−5,000, 5,000− 10,000, 10,000−50,000, and over 50,000 subjects.

3) Research design

The research designs were classified as follows.

(1) Cross-sectional studies included studies that used data which observed at a specific time during the disease progress of patients, including health check-ups or National Health and Nutrition Examination Survey (NHANES).

(2) Prospective studies were sub-categorized into clinical trials and cohort studies, including studies in which the outcomes were measured at least twice or repeatedly during a certain period. Cohort studies refer to studies that followed up patients with certain risk factors to find out the results and clinical trials refer to prospective studies that proceed to prove the effects of a treatment.

(3) Retrospective studies were sub-categorized into registry

Table 2. Category of statistical methods.

Statistics	Brief description
No statistical method	No statistical content
Descriptive method	Only descriptive analysis
Contingency table	Chi-square test, Fisher's exact test, McNemar's test
T-test	One sample, matched-pair, Two sample t-test
F-test	ANOVA, ANCOVA, MANOVA, repeated measure ANOVA
Correlation analysis	Pearson, Spearman correlation analysis
Regression analysis	Simple linear, multiple, logistic regression
Epidemiologic statistics	Relative risk, odds ratio, sensitivity, specificity, ROC curve, positive-negative rate, predict value, Kappa
Non-parametric tests	Sign test, Wilcoxon signed rank-sum test, Kruskal-Wallis, Mann-Whitney U-test, Cochran-Mantel-Haenzel test, Cochran-Amitage trend test, Kolmogorov-Smirnov test, Kendall's Tau-b
Survival analysis	Life table, log-rank test, Cox proportional hazard regression, Kaplan-Meier estimate
Factor analysis	Explanatory factor analysis, Confirmatory factor analysis
Reliability analysis	Cronbach's alpha
Meta analysis	

ROC: receiver operating characteristic.

studies, case-control studies, and historical cohort studies, including studies that reviewed charts by using medical records. Case-control studies refer to studies that retrospectively identify causes of disease by comparing patients and control group.

4) Statistical methods

The statistical method that Yu et al.[2] used to compare KJFM and JFP, was used and categorized as shown in Table 2. FM was excluded because articles published in FM after 1998 were included in this study and there were too many articles in the education area.

3. Statistical Analyses

All results were presented as numbers and percentages according to the classified categories.

RESULTS

1. Characteristics of Subjects

Of the 3,226 original articles, the majority of them were published by KJFM 1,549; followed by JFP 1,355; and then FM 322. Because JFP has been mostly publishing conference papers since 2002, the number of original articles has decreased. FM had the least papers because the articles from 1988 were included in the categorization.

2. Major Content Area of Family Medicine Journals

In the biomedical area, KJFM and JFP were 61.7% and

Table 3. Classification of major content area.

Content area	FM	JFP	KJFM
Biomedical	58 (18.0)	910 (67.2)	955 (61.7)
Biopsychosocial	29 (9.0)	158 (11.7)	175 (11.3)
Education	180 (55.9)	154 (11.4)	249 (16.1)
Health service	55 (17.1)	133 (9.8)	170 (11.0)
Total	322 (100.0)	1,355 (100.0)	1,549 (100.0)

Values are presented as number (%).
FM: Family Medicine, JFP: Journal of Family Practice, KJFM: Korean Journal of Family Medicine.

67.2%, respectively, and FM was 18.0%. In the biopsychosocial area, FM was 9.0%, KJFM and JFP were 11.3% and 11.7%. In the education area, KJFM and JFP were 16.1% and 11.4%, and FM was 55.9%. In the health service area, FM had the highest proportion with 17.1%, while JFP had 9.8% and KJFM had 11.0% (Table 3).

3. Special Features of Data Size

1) Overall study

In all three journals, the majority of the articles used a data size of 100−300 subjects and their proportions were KJFM 29.1%, JFP 26.1%, and FM 28.6%. The proportion of articles that used a data size of 5,000−10,000 subjects was the highest in KJFM 2.3%, then JFP 1.9%, and FM 1.6%. The articles that used the data size of over 50,000 subjects were 0.5% in KJFM, 0.7% in JFP, and 1.9% in FM (Table 4).

2) Population-based studies

The largest data size of FM was 54,520 subjects of the 1996 & 1997 National Ambulatory Medical Care Surveys based cross-sectional study at the US National Center for Health Statistics in 2002 and the second-largest data size was the NHANES I Epidemiologic Follow-up Study with 6,558 subjects in 2005. JFP

Table 4. Classification of data size.

No. of subjects	FM	JFP	KJFM
Under 50	62 (19.3)	89 (6.6)	172 (11.1)
50−100	52 (16.1)	305 (22.5)	314 (20.3)
100−300	92 (28.6)	354 (26.1)	450 (29.1)
300−500	46 (14.3)	77 (5.7)	140 (9.0)
500−1,000	25 (7.8)	191 (14.1)	184 (11.9)
1,000−3,000	22 (6.8)	180 (13.3)	155 (10.0)
3,000−5,000	5 (1.6)	97 (7.2)	52 (3.4)
5,000−10,000	5 (1.6)	26 (1.9)	36 (2.3)
10,000−50,000	7 (2.2)	27 (2.0)	38 (2.5)
Above 50,000	6 (1.9)	9 (0.7)	8 (0.5)
Total	322 (100.0)	1,355 (100.0)	1,549 (100.0)

Values are presented as number (%).
FM: Family Medicine, JFP: Journal of Family Practice, KJFM: Korean Journal of Family Medicine.

had the largest size 2,846,210 subjects of a US NHANES based a cross-sectional study in 2005. The largest data size of KJFM was 6,072,196 subjects in registry study which used health insurance information in 1997, and a cancer prevention data-based cohort study was 1,306,476 subjects in 2006.

4. Research Design

In all three journals, the majority of the articles were cross-sectional studies, with 72.4% in KJFM, 58.4% in JFP, and 66.8% in FM. Among the prospective studies, cohort studies were 0.8% in KJFM, 3.1% in JFP, and 5.0% in FM and the clinical trials were 6.3% in KJFM, 12.6% in JFP, and 15.2% in FM. Among

retrospective studies, historical cohort studies were 0.3% in KJFM, 1.5% in JFP, and 1.9% in FM and case-control studies were 8.6% in KJFM, 10.2% in JFP, and 0.6% in FM, moreover registry studies were 11.6% in KJFM, 14.2% in JFP, and 10.6% in FM (Table 5).

The proportions of prospective studies and retrospective studies in JFP were higher than those in KJFM until 2002, and KJFM showed higher proportions of prospective studies and retrospective studies than those of JFP from 2003 (Table 6).

5. Statistical Methods

From 1978 to 1987, articles which used only descriptive

Table 5. Classification of original article by research design.

Research design	FM	JFP	KJFM	Total
Cross-sectional	215 (66.8)	791 (58.4)	1,121 (72.4)	2,127 (65.9)
Prospective				
Cohort	16 (5.0)	42 (3.1)	12 (0.8)	70 (2.2)
Clinical trial	49 (15.2)	171 (12.6)	98 (6.3)	318 (9.9)
Retrospective				
Historical cohort	6 (1.9)	21 (1.5)	5 (0.3)	32 (1.0)
Case-control	2 (0.6)	138 (10.2)	133 (8.6)	273 (8.5)
Registry	34 (10.6)	192 (14.2)	180 (11.6)	406 (12.6)
Total	322 (100.0)	1,355 (100.0)	1,549 (100.0)	3,226 (100.0)

Values are presented as number (%).

FM: Family Medicine, JFP: Journal of Family Practice, KJFM: Korean Journal of Family Medicine.

Table 6. Classification of yearly research design by three journals.

Years	Cross-sectional			Prospective			Retrospective			Total		
	FM	JFP	KJFM	FM	JFP	KJFM	FM	JFP	KJFM	FM	JFP	KJFM
1978−1982	-	122 (9.0)	1 (0.1)	-	15 (1.1)	0 (0.0)	-	20 (1.5)	0 (0.0)	0 (0.0)	157 (11.6)	1 (0.1)
1983−1987	-	328 (24.2)	21 (1.4)	-	59 (4.4)	1 (0.1)	-	111 (8.2)	8 (0.5)	0 (0.0)	498 (36.8)	30 (1.9)
1988−1992	-	216 (15.9)	144 (9.3)	-	76 (5.6)	10 (0.6)	-	101 (7.5)	58 (3.7)	0 (0.0)	393 (29.0)	212 (13.7)
1993−1997	-	90 (6.6)	250 (16.1)	-	31 (2.3)	14 (0.9)	-	80 (5.9)	81 (5.2)	0 (0.0)	201 (14.8)	345 (22.3)
1998−2002	73 (22.7)	17 (1.3)	281 (18.1)	26 (8.1)	23 (1.7)	24 (1.5)	15 (4.7)	24 (1.8)	98 (6.3)	114 (35.4)	64 (4.7)	403 (26.0)
2003−2007	96 (29.8)	13 (1.0)	223 (14.4)	21 (6.5)	5 (0.4)	29 (1.9)	19 (5.9)	12 (0.9)	57 (3.7)	136 (42.2)	30 (2.2)	309 (19.9)
2008−2011	46 (14.3)	5 (0.4)	201 (13.0)	18 (5.6)	4 (0.3)	32 (2.1)	8 (2.5)	3 (0.2)	16 (1.0)	72 (22.4)	12 (0.9)	249 (16.1)
Total	215 (66.8)	791 (58.4)	1,121 (72.4)	65 (20.2)	213 (15.7)	110 (7.1)	42 (13.0)	351 (25.9)	318 (20.5)	322 (100.0)	1,355 (100.0)	1,549 (100.0)

Values are presented as number (%).

FM: Family Medicine, JFP: Journal of Family Practice, KJFM: Korean Journal of Family Medicine.

Table 7. Classification of original article by year and by statistical methods.

Statistics	1978–1982		1983–1987		1988–1992		1993–1997		1998–2002		2003–2007		2008–2011		Total	
	JFP	KJFM	JFP	KJFM	JFP	KJFM	JFP	KJFM	JFP	KJFM	JFP	KJFM	JFP	KJFM	JFP	KJFM
No statistical method	78 (49.4)	0 (0.0)	28 (10.4)	0 (0.0)	21 (5.4)	1 (0.5)	11 (2.7)	0 (0.0)	2 (1.6)	1 (0.1)	2 (4.7)	1 (0.1)	3 (11.1)	1 (0.2)	145 (10.3)	4 (0.1)
Descriptive method	72 (45.6)	1 (100.0)	93 (34.4)	13 (30.2)	62 (16.1)	49 (25.7)	27 (6.7)	55 (7.5)	5 (4.1)	42 (4.6)	3 (7.0)	20 (2.8)	5 (18.5)	8 (1.7)	267 (18.9)	188 (6.1)
Contingency table	4 (2.5)	0 (0.0)	56 (20.7)	8 (18.6)	114 (29.5)	65 (34.0)	88 (21.7)	210 (28.7)	28 (23.0)	221 (24.2)	8 (18.6)	159 (22.4)	6 (22.2)	101 (21.5)	304 (21.5)	764 (25.0)
T-test	0 (0.0)	0 (0.0)	39 (14.4)	7 (16.3)	81 (21.0)	29 (15.2)	65 (16.0)	156 (21.3)	14 (11.5)	182 (19.9)	7 (16.3)	136 (19.2)	4 (14.8)	83 (17.7)	210 (14.9)	593 (19.4)
Z-test	0 (0.0)	0 (0.0)	2 (0.7)	1 (2.3)	1 (0.3)	0 (0.0)	1 (0.2)	1 (0.1)	1 (0.8)	2 (0.2)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	5 (0.4)	4 (0.1)
F-test	3 (1.9)	0 (0.0)	12 (4.4)	3 (7.0)	19 (4.9)	5 (2.6)	22 (5.4)	57 (7.8)	11 (9.0)	73 (8.0)	4 (9.3)	76 (10.7)	1 (3.7)	50 (10.7)	72 (5.1)	264 (8.6)
Correlation analysis	1 (0.6)	0 (0.0)	11 (4.1)	8 (18.6)	12 (3.1)	8 (4.2)	28 (6.9)	82 (11.2)	2 (1.6)	89 (9.7)	3 (7.0)	69 (9.7)	1 (3.7)	31 (6.6)	58 (4.1)	287 (9.4)
Regression analysis	0 (0.0)	0 (0.0)	9 (3.3)	1 (2.3)	26 (6.7)	8 (4.2)	32 (7.9)	66 (9.0)	25 (20.5)	149 (16.3)	5 (11.6)	138 (19.4)	5 (18.5)	102 (21.7)	102 (7.2)	464 (15.2)
Non-parametric test	0 (0.0)	0 (0.0)	5 (1.9)	0 (0.0)	11 (2.8)	11 (5.8)	38 (9.4)	30 (4.1)	8 (6.6)	50 (5.5)	2 (4.7)	36 (5.1)	0 (0.0)	28 (6.0)	64 (4.5)	155 (5.1)
Epidemiologic statistics	0 (0.0)	0 (0.0)	12 (4.4)	2 (4.7)	21 (5.4)	8 (4.2)	52 (12.8)	43 (5.9)	12 (9.8)	64 (7.0)	5 (11.6)	64 (9.0)	2 (7.4)	53 (11.3)	104 (7.4)	234 (7.6)
Factor analysis	0 (0.0)	0 (0.0)	1 (0.4)	0 (0.0)	4 (1.0)	2 (1.0)	10 (2.5)	4 (0.5)	2 (1.6)	7 (0.8)	1 (2.3)	2 (0.3)	0 (0.0)	2 (0.4)	18 (1.3)	17 (0.6)
Survival analysis	0 (0.0)	0 (0.0)	1 (0.4)	0 (0.0)	8 (2.1)	2 (1.0)	9 (2.2)	4 (0.5)	6 (4.9)	8 (0.9)	2 (4.7)	3 (0.4)	0 (0.0)	2 (0.4)	26 (1.8)	19 (0.6)
Reliability analysis	0 (0.0)	0 (0.0)	1 (0.4)	0 (0.0)	5 (1.3)	3 (1.6)	19 (4.7)	24 (3.3)	1 (0.8)	23 (2.5)	1 (2.3)	5 (0.7)	0 (0.0)	6 (1.3)	27 (1.9)	61 (2.0)
Meta analysis	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1 (0.3)	0 (0.0)	3 (0.7)	0 (0.0)	5 (4.1)	2 (0.2)	0 (0.0)	1 (0.1)	0 (0.0)	2 (0.4)	9 (0.6)	5 (0.2)
Total	158 (100.0)	1 (100.0)	270 (100.0)	43 (100.0)	386 (100.0)	191 (100.0)	405 (100.0)	732 (100.0)	122 (100.0)	913 (100.0)	43 (100.0)	710 (100.0)	27 (100.0)	469 (100.0)	1,411 (100.0)	3,059 (100.0)

Values are presented as number (%).

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methods were 34.4% in KJFM and 30.2% in JFP. However, from 1988 to 2011, contingency table and t-test were the most frequently used in KJFM and JFP, approximately 25% and 15%. The articles using reliability analysis in KJFM increased from 1.6% in 1992 to 3.3% in 1993, whereas JFP increased from 1.3% in 1992 to 4.7% in 1993 (Table 7).

6. New Terms and Methods

A ridit analysis for comparing ordinal scale responses such as degree of injury, dissatisfaction, and preference or agreement, was used by KJFM in 1999. The Breslow-Day test to examine the homogeneity of odds ratios, was used for the first time in 2002, and a cost-effectiveness analysis was first reported in an article related to health service in 2004.

In 1978, risk-benefit analysis for the comparison between the risk and its related benefits was mentioned in an article related to health service in JFP. In 2002, articles that used Cochran's Q test, which assesses the homogeneity or consistency within the group, and funnel plot in a meta-analysis were used for the first time.

In FM, a path analysis which used to find the causal relationship between variables, was reported in 1999, and a content analysis which categorizes the contents subjectively in volume to analyze them based on certain standards, was used for the first time in 2009.

DISCUSSION

As a result of comparing original articles published by KJFM 1,549, JFP 1,355, and FM 322, KJFM had a small number of papers, smaller data sizes, and relatively simple statistical methods until 1992 compared to FM and JFP. However, the proportions of original articles published by KJFM increased from 1.9% in 1987 to 13.7% in 1988, and observational studies of KJFM has increased since 1997.

KJFM and JFP were 61.7% and 67.2% in the medical area, and FM was 55.9% in the education area. Yu et al.[2] analyzed articles published by KJFM and JFP from 1981 to 1992, and found that KJFM had 51.1% articles and JFP had 44.4% in the biomedical area. These results showed similar as this study on the fact that both KJFM and JFP had the highest portion of articles in the biomedical area.

In all three journals, the majority of the articles used data sizes of 100−300 subjects, which were 29.1% in KJFM, 26.1% in JFP, and 28.6% in FM. Also, FM showed the highest proportion, 1.9%, of articles that used data sizes over 50,000 subjects.

In research design, cross-sectional studies were mostly used in all three journals; 72.4% in KJFM, 58.4% in JFP, and 66.8% in FM. FM had the highest proportion, 20.2%, of prospective studies, and JFP showed the highest proportion, 25.9%, of retrospective studies. Jacobsen and Meininger[5] analyzed articles published in nursing research from 1956 to 1983 and found that the proportion of cross-sectional studies was larger than that of longitudinal studies. This result showed the same result as this study in the fact that both KJFM and JFP had the highest portion of cross-sectional studies.

Contingency table and t-test were the most frequently used in KJFM, with proportions of 25% and 19.4%, regression analysis 15.2%, correlation analysis 9.4%, and F-test 8.6% were used. Moreover, complex statistical methods such as epidemiologic statistics, survival analysis, and reliability analysis have been used increasingly since 1993. Sim et al.[6] analyzed the original articles published in KJFM, and found that chi-square, t-test and analysis of variance (ANOVA) were the most frequently used, also, Lee and Ahn[7] found that 30.6% of the medical articles published in Korea in the 1980s did not even mention their statistical methods, and that most articles used t-test, correlation analysis, and contingency table. Although there could be some differences of categorization in regards to the statistical methods, it showed that the statistical methods such as chi-square test, t-test, ANOVA, and correlation analysis were highly used in many medical articles.

In conclusion, it was confirmed that the study activities in the field of family medicine have become more active over the years, but still has conducted based on the relatively small data sizes and weak research designs. It will be helpful to conduct prospective studies such as cohort studies and clinical trials, also, we need to collaborate to accumulate the small sized data sets and try to make a registry. More refined statistical method such as a propensity score matching analysis for retrospective data could be an alternative to increase the academic level of family medicine.

CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

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