



Professionalism in Family Medicine Residency Program
in Qatar page 4

From the Editor

Chief Editor:

A. Abyad
MD, MPH, AGSF, AFCHSE
Email: aabyad@cyberia.net.lb

Ethics Editor and Publisher

Lesley Pocock
medi+WORLD International
AUSTRALIA

Email:

lesleypocock@mediworld.com.au

.....
This eighth issue this year has various papers from the region including a paper from Nepal.

Salem M et al did a descriptive cross sectional study to evaluate professionalism in family medicine residency program in Qatar. This study was conducted in the Family Medicine Residency Program in Qatar. The sample size was 41 residents; all residents in the program at time of the study in 2016-2017. This study showed that the overall professional domains giving appropriate scores in all the domains with total score 84.3+15.5 from 120 while self-assessment score is 31.8+6.2 from total score of 40. The authors concluded that family medicine residents are capable of consistently performing professionally across the domains of professionalism. However, the Excellence and Altruism domains are in need for improvement.

Sushil et al did a cross-sectional study performed on 584 young male adults aged between 17 and 22 years. Two variables were noted from each individual: Arterial blood pressure and blood group. Chi-square test was used to find the relation between these two variables. The authors found that the mean systolic blood pressure was significantly high in A blood group when compared to other blood groups (P value 0.04). The correlation between diastolic blood pressure and blood groups A, B, AB and O were not found. They concluded that suggested that A blood group individuals have more susceptibility for high blood pressure indicating a potential risk of cardiovascular diseases with genetic relation between ABO blood group and hypertension. More and more studies in larger population and different geographical area are required to prove the correlation between ABO blood group and the blood pressure.

AL-Mutawa N et al; assess the implications of introducing reflective practice in Family Medicine Residency Program on residents perceptions in Qatar. They used a cross-sectional study design. A purposive sample of 26 (34) residents were recruited. Inclusion criteria: all current PGY1-PGY3 residents. PGY4 residents as well as residents who have finished the 4 years Training were excluded. The study included 26 residents from PGY-1, PGY-2 and PGY-3. More than 80% of respondents thought that the sessions were useful and enjoyable.

The authors concluded that by enhancing reflective practice, family medicine residents will be able to improve their insight into their strengths and weaknesses, and develop an action plan to mitigate weaknesses and improve their case management in the future. This will help to improve competencies far better Primary Care work force in PHCC.

Adalat M et al; investigated the effects of a Persian herbal medicine treatment including *Crocus sativus*, *Hypericum perforatum*, *Cinnamon verum*, and *Vitis vinifera* on fatigue and sleep disorders in MS patients. They did a double-blinded, clinical trial, 52 patients with MS suffering from fatigue or sleep disorders were randomly divided into two groups (herbal remedy or the placebo). The insomnia severity scale (ISI) and Pittsburgh sleep quality index (PSQI) were used to assess sleep difficulties. There was a significant reduction in FSS and MFIS scores in both groups, but the mean change rate in FSS and MFIS scores in the drug group was significantly higher compared to the placebo group. The present study suggests that herbal extract treatment may improve sleep disorder and fatigue symptoms in MS patients. Further investigations are needed to know the exact mechanism of actions.

Helvacı. M.R et al; tried to understand whether or not there is a lower prevalence of rheumatoid arthritis (RA) due to moderate to severe immunosuppression in sickle cell diseases (SCDs). All patients with the SCDs and age and sex-matched controls were studied. The study included 428 patients with the SCDs (220 males) and 433 controls (223 males). The authors concluded that SCDs are severe and continuous inflammatory processes on vascular endothelium, particularly at the capillary level, and terminate with end-organ failures in early years of life.

Beside that, SCDs may cause moderate to severe immunosuppression by several mechanisms that may be the cause of significantly lower prevalence of RA in the SCDs.

Brygel et al evaluate the place of models in Surgical education workshops. Until recently surgical procedures and training were carried out under an apprenticeship type system. With technological advances and medico legal pressures and so many new operations being devised this system has become outdated. As a result skill laboratories have been introduced. These cater from the most basic skills such as, making incisions, knot tying and suturing, to major surgery.

Bendak L looked at the importance of physical activities for Down syndrome students which will reflect positively on their spatial relations. The quantitative approach was adopted where the total number of the Down syndrome students in the field of study was 10 from two private schools. The students were divided into two groups where the control group was 5 Down syndrome students and the experimental group was also 5 Down syndrome students. The measuring instrument or tool that was used in this study is the Woodcock-Johnson III. A pretest was done on all 10 students during the first trimester of the school year. Then the physical activities intervention was applied for two trimesters. After that, the posttest was applied and the results were submitted to analysis, where the means and standard deviations, the independent samples T- test, and the paired samples T- test were calculated. The results of this study showed statistical differences to the benefit of the experimental group over the controlled group.

Copyright

.....
While all efforts have been made to ensure the accuracy of the information in this journal, opinions expressed are those of the authors and do not necessarily reflect the views of The Publishers, Editor or the Editorial Board. The publishers, Editor and Editorial Board cannot be held responsible for errors or any consequences arising from the use of information contained in this journal; or the views and opinions expressed.
p-ISSN: 1839-0188; e-ISSN : 1839-0196
<http://www.mejfm.com>
<http://www.worldfamilymedicine.com>
.....

Table of Contents

- 2 **Editorial**
DOI: 10.5742MEWFM.2018.93480
- Original Contribution / Clinical Investigation**
- 4 **Professionalism in Family Medicine Residency Program in Qatar**
Mohamed Salem, Amal Al-Ali, Noura Alm-Mutawaa, Wafaa Yousuf, Noof Almansouri
DOI: 10.5742MEWFM.2018.93481
- 9 **Association of ABO blood groups with blood pressure in young male adults of Bhaktapur:
A cross-sectional study**
Kharel Sushil, Raut Binod, Gupta Rani
DOI: 10.5742MEWFM.2018.93482
- 13 **Implications of Introducing Reflective Practice to the Family Medicine Residency Program in Qatar**
Noora Al-Mutawa, Mohamed H Mahmoud, Saleh Attal, Hisham Elmahdi
DOI: 10.5742MEWFM.2018.93483
- Population and Community Studies**
- 22 **Anti-Fatigue and Hypnotic Effects of a Traditional Herbal Extract on Multiple Sclerosis Patients:
A double blind randomized clinical trial**
*Maryam Adalat, Mohammad Khalili, Hormoz Ayromlou, Sajjad Haririan, Hossein Rezaeizadeh,
Ali Akbar Safari, Arman Zargaran*
DOI: 10.5742MEWFM.2018.93484
- 32 **What a low prevalence of rheumatoid arthritis in sickle cell diseases**
Mehmet Rami Helvaci, Abdulrazak Abyad, Lesley Pocock
DOI: 10.5742MEWFM.2018.93485
- Education and Training**
- 38 **Using Physical Activities for Improving Spatial Relations of Students with Down Syndrome**
Lama Bendak
DOI: 10.5742MEWFM.2018.93487
- 46 **Surgical Skills Training With Models**
Maurice Brygel
DOI: 10.5742MEWFM.2018.93486

Professionalism in Family Medicine Residency Program in Qatar

Mohamed Salem (1)
Amal Al-Ali (2)
Noura Alm-Mutawaa (2)
Wafaa Yousuf (2)
Noof Almansouri (2)

(1) Former Assistant Professor, Suez canal University, Egypt, Consultant in Primary Health Care Corporation, Qatar

(2) Primary Health Care Corporation, Qatar

Correspondence:

Dr. Mohamed Salem, Former Assistant Professor, Suez canal University, Egypt
 Consultant in Primary Health Care Corporation, Qatar

Mobile No: 0097470084817

Email: m_salem1973@yahoo.com

Received: June 19, 2018; Accepted: July 1, 2018; Published: August 1, 2018

Citation: Salem M, Al-Ali A, Alm-Mutawaa N, Yousuf W, Almansouri N. Professionalism in Family Medicine Residency Program in Qatar. World Family Medicine. 2018; 16(8): 4-8. DOI: 10.5742MEWFM.2018.93481

Abstract

Background: Medical professionalism is the ability to meet the relationship-centered expectations required to practice medicine competently. Professionalism is based on the principles of primacy of patient welfare, patient autonomy and social justice.

Objective of the study: To evaluate professionalism in family medicine residency program in Qatar.

Methods: A descriptive cross sectional study to assess professionalism in Family Medicine Program in Qatar. This study was conducted in Family Medicine Residency Program in Qatar. It included all residents in Family Medicine Residency Program. The sample size was 41 residents; all residents in the program at the time of the study in 2016-2017.

Results: Results show resident characteristics in which males represent 60% and females 40%; 55% were married, 7.5% have social problems and 17.5% see more than 20 patients per day.

The overall professional domains giving appropriate scores in all the domains with total score 84.3+15.5 from 120, while self-assessment score was 31.8+6.2 from a total score of 40. The relation between resident characteristics and professional domains in the form of significant relations for gender, as males report high scores in excellence domain, residents in year four report high score in excellence, while residents in year three report high score in self-assessment and residents who see 10-20 patients per day report high score in altruism and self-assessment.

Conclusion: The current study revealed that family medicine residents are capable of consistently performing professionally across the domains of professionalism. However, the Excellence and Altruism domains are in need of improvement.

Key words: professionalism, Family Medicine, Residency, Program, Qatar

Background

Medical professionalism is the ability to meet the relationship-centered expectations required to practice medicine competently. Professionalism is based on the principles of primacy of patient welfare, patient autonomy and social justice. It involves the following professional responsibilities: competence, honesty, patient confidentiality, appropriate relations with patients, improving quality of care, improving access to care, just distribution of finite resources, commitment to scientific knowledge, maintaining trust by managing conflicts of interest, and commitment to professional responsibilities [1].

Professionalism is related to patient satisfaction. Patients are more likely to be satisfied with physicians who behave professionally. [2] Patients are more likely to follow through with treatment recommendations when they trust their physician (trust is a component of professionalism). [3]

Most patient complaints about physicians involve physicians' unprofessional behavior. Patients are more likely to bring legal action against physicians they perceive as behaving unprofessionally than other physicians. [4] The educational environment, whether through formal or informal curricula, appears to influence learner attitudes and behavior. [5]

One study discerned relationships between the ethical environment and medical students' ethical behavior. [6] In another study, residents reported learning most about professionalism from observing role models. [7] Furthermore, research suggests that business and cultural environments influence professionalism among practicing physicians. [8]

Methods

Study Design: Descriptive cross sectional study to assess professionalism in Family Medicine Program in Qatar

Study setting: This study was conducted in West Bay Training Health Center affiliated to Primary Health Care Corporation in Qatar where the Family Medicine Residency Program runs its activity in the form of academic days and continuity care clinics.

Study Subjects: Included all residents in Family Medicine Residency Program

Sampling: The sample size was 41 residents, all residents in the program at the time of the study in 2016-2017.

Data Collection Methods:

Demographic data and some work characteristics including: age, gender, marital status, social problems, and number of patients per day were gathered.

The first part of the questionnaire measures Professionalism: by using ABIM Scale to Measure Professional Attitudes and Behaviors in Medical

Education. The Scale to Measure Professional Attitudes and Behaviors in Medical Education (SMPABME) is a self-administered questionnaire that consists of 12 items, each rated on a 9-item scale from never zero, to always ten. The SMPABME obtains respondents' opinions about professionalism in their educational environment. Since the items ask the respondent to report on the behaviors of others (versus the respondent's own behavior), it can be used to obtain information about sensitive professionalism areas (e.g., deception) that respondents may be unwilling to report about themselves; thus it can give information about program-wide behaviors. With only 12 items, the SMPABME is easy to administer. Construct validity of the SMPABME may be inferred from a factor analysis which indicated that it measured excellence, honor/integrity, and altruism/respect. The inter-item reliability of the SMPABME is 0.71. Information about the behavior of other important people in the learners' environment (e.g., supervising physicians, nurses, laboratory staff) would provide more accurate information about the educational environment. Excellence domain consists of 5 items with a maximum score of 50, Honor/Integrity domain consists of 4 items with a maximum score of 40, and Altruism/Respect domain consists of 3 items with a maximum score of 30.

Excellence means exceeding expectations and commitment to lifelong learning, Honor and integrity mean adhering to personal and professional codes, being fair, truthful, straightforward, and meeting commitments. Altruism means putting patients' best interests first [9].

The second part of the tool is self-assessment questions from UMKC-SOM Climate of Professionalism Survey (University of Missouri, Kansas City School of Medicine). It contains 10 questions about professional behavior rated (mostly-often-sometimes-rarely) with scores of 4,3,2, and 1 for each rate respectively [10].

Data Analysis: Data collected was analyzed using Epi Info and suitable tables and figures for different variables were used. T test, Chi square and P value were used when needed.

Results

Table 1: Shows resident characteristics in which males represent 60% and females 40%, 55% are married, 7.5% have social problems and 17.5% see more than 20 patients per day.

Table 2: Shows the overall professional domains giving appropriate scores in all the domains with total score 84.3+15.5 from 120 while self-assessment score is 31.8+6.2 from total score of 40.

Table 3: Shows the relation between resident characteristics and professional domains in the form of significant relations for gender, as males report high scores in excellence domain, residents in year four report high score in excellence while residents in year three report high score in self-assessment and residents who see 10-20 patients per day report high score in altruism and self-assessment.

Table 1: Resident characteristics

| Characteristics | No | Percentage |
|-----------------------------------|----|------------|
| Gender | | |
| Male | 24 | 60% |
| Female | 16 | 40% |
| Age | | |
| <30 | 19 | 48.72% |
| ≥30 | 20 | 51.28% |
| Residency Level | | |
| 1 | 9 | 22.5% |
| 2 | 11 | 27.5% |
| 3 | 7 | 17.5% |
| 4 | 13 | 32.5% |
| Number of patients per day | | |
| <10 | 17 | 42.5% |
| 10–20 | 16 | 40% |
| >20 | 7 | 17.5% |

Table 2: Domains of professionalism score among residents

| Domain | Mean ± SD | Total Score | Percentage |
|-----------------|-----------|-------------|------------|
| Excellence | 33.4±7.4 | 50 | 66.8% |
| Honor | 33.4±7.7 | 40 | 83.6% |
| Altruism | 22.9±6.1 | 30 | 75.5% |
| Total Score | 84.3±15.5 | 120 | 70% |
| Self-Assessment | 31.8±6.2 | 40 | 79.5% |

Table 3: Domains of Professionalism and resident characteristics

| Gender | Male | Female | | | P Value |
|---------------------------|---------------|----------------|---------------|---------------|----------------|
| Excellence | 35.7±6.3 | 29.8±7.9 | | | 0.0071* |
| Honor | 32.7±7.7 | 34±7.9 | | | 0.6532 |
| Altruism | 22.1±6.3 | 23.9±5.6 | | | 0.8076 |
| Self-Assessment | 32.04±6.2 | 31.53±6.3 | | | 0.4049 |
| Residency level | Year 1 | Year 2 | Year 3 | Year 4 | P Value |
| Excellence | 36.5±11.5 | 30.27±4.1 | 32.8±4.7 | 38.23±5.8 | 0.0279* |
| Honor | 36.1±2.8 | 33.7±5.6 | 34.7±8.9 | 30.5±10.3 | 0.4441 |
| Altruism | 25.37±2.1 | 22.61±4.6 | 24.28±7.4 | 20.58±7.6 | 0.3367 |
| Self-Assessment | 31.5±6.6 | 27.6±7.5 | 35.8±3.1 | 33.7±3.9 | 0.0396* |
| Number of patients | <10 | 10 - 20 | >20 | | P Value |
| Excellence | 31.05±7.8 | 33.58±7.4 | 38.14±4.6 | | 0.1156 |
| Honor | 35.2±5.1 | 33.12±8.3 | 30.14±10.6 | | 0.3648 |
| Altruism | 23.8±3.2 | 24.35±6.6 | 16.33±5.9 | | 0.0115* |
| Self-Assessment | 28.5±6.8 | 33.8±7.5 | 34.4±3.7 | | 0.0302* |

*Significant P Value <0.05

Discussion

In this study the mean total score percentage of professionalism is 70%. This result is matched with a study done in Egypt [11] revealing a score of 71%, however the University of Missouri, Kansas City School of Medicine reported mean score percentages of 75.08 % [12].

These similar scores represent what is actually recognized in teaching professionalism in recent years but there is still need to improve this score by studying its related factors, which could be due to working hours and work overload.

However the Excellence domain score of professionalism in our study is low, 66.6%, which points to lack of some professional behaviours and explanation of this could be due to deficiencies of role models in clinical education environment settings and this warrants attention for selection of residents and faculty members putting into consideration professionalism assessment. This result matched an Egyptian study [11] which showed a mean score percentage of 61.65%.

At the same time, the Honor domain mean score was estimated to be 83.6 % which matches other study results [11,13] revealing the mean score of the Honor domain as 81.69% and 77.7% respectively. This high mean score of our study at this domain showed that family medicine residents have higher standards of professional behaviours as comparable studies were on internal medicine residents, and the curriculum and working environment are different.

As regards the domain of Altruism, the estimated mean score percentage was 75.5%. In other studies [11, 14] it was 72.5% and 70%. The higher percentage score in this study could be due to respect our residents are paying to patients, patients' families, and colleagues, also these are professional characteristics of the future family physician.

The self-assessment of professionalism by residents in this study rated a score percentage of 79.5% while in previous studies [11, 14] scores were 71.5% and 75.01%. These results indicate that our residents may overestimate themselves with higher expectations.

This study concluded a significant relation between professionalism and residency level in the form of residents in year four report high score in excellence domain. This is in concordance with a study [11] which stated that professionalism of residents as evaluated by their peers was found to be progressively increasing from the first year of residency to the third year as evidenced by the increase in the mean scores in all domains., This finding was consistent with that of study [15] which found that senior residents were more interested in peer evaluation than junior residents and at the same time their level of professionalism was evaluated to be better. It seems that the experience of senior residents allows them to gain more professionalism behaviours and perception; the same result of statistically significant difference between

the residency year and level of professionalism on the Excellence domain was supported in the study [14].

In this study, there is a significant relationship regarding residency level and self-assessment in the form of residents in year three reporting a high score in self-assessment domain. This matched a statistically significant difference between residency year and the mean score of self-assessment [11]. In the third year of their residency, residents become more conscious of competence which increased their self-assessment according to learning theory.

In this study, a significant relationship was found regarding residents who see 10-20 patients per day reporting a high score in altruism and self-assessment. This matched other findings which indicated that professionalism is highly related to residency year, and number of working hours in study [16].

Conclusions

The current study revealed that family medicine residents are capable of consistently performing professionally across the domains of professionalism. However, the Excellence and Altruism domains are in need of improvement.

What is already known on this topic :

- No previous study to assess professionalism among family medicine residents in Qatar

What this study adds :

- It shows consistent professional attitudes in all professionalism domains among family medicine residents
- There is areas for improvement in Excellence and Altruism

Limitations:

- The geographical and demographic profile of this study may limit generalization
- It is specific for residents in the family medicine resident programs..

Acknowledgments:

We would like to acknowledge all Family Medicine faculty members and residents in the Family Medicine Residency Program. We acknowledge Dr Ahmed Mustafa Specialist in Primary Health Care in Qatar for his efforts and help. We appreciate the efforts of Dr Hisham AL Mahdi Consultant in Primary Health Care in Qatar in helping in statistical analysis

Ethical Considerations:

This research project is approved from IRB (Institutional Review Board) in Primary Health Care Corporation

References

1. www.acgme.org .Advancing education in medical professionalism: An educational resource from the ACGME Outcome Project : ©2004 ACGME.
2. Hall MA, Zheng B, Dugan E, Camacho F, Kidd KE, Mishra A, et al. Measuring patients trust in their primary care providers. *Med Care Res Review* 2002; 59:293-318.
3. Hauck FR, Zyzanski SJ, Alemagno SA, Medalie JH. Patient perceptions of humanism in physicians: effects on positive health behaviors. *Fam Med* 1990; 22:447-52.
4. Hickson GB, Federspiel CF, Pichert JW, et al. Patient complaints and malpractice risk. *JAMA* 2002; 287:2951-7.
5. Stern DT. Values on call: a method for assessing the teaching of professionalism. *Acad Med* 1996; 71(10):S37-9.
6. Feudtner C, Christakis D, Christakis N. Do clinical clerks suffer ethical erosion? Students' perceptions of their ethical environment and personal development. *Acad Med* 1994; 69(8):670-9.
7. Brownell AKW, Cote L. Senior residents' views on the meaning of professionalism and how they learn about it. *Acad Med* 2001; 76:734-7.
8. Freeman VG, Rathore SS, Weinfurt KP, Schulman KA, Sulmasy DP. Lying for patients: physician deception of third-party payers. *Arch Intern Med* 1999; 159:2263-70.
9. Advancing Education in Medical Professionalism, An Educational resource From ACGME Outcome Project, Enhancing residency education Through outcome Assessment .2004
10. Louise E Arnold PhD, George S Thompson MD and Jennifer Quaintance, PhD at the University of Missouri-Kansas City School of Medicine, UMKC-SOM. © 2008
11. Salem A, Talaat W, Kamel MH, Hassan N . Assessing Professionalism among Residents: Peer and Self-assessment. *Intel Prop Rights*.2015; 3: 148.
12. Quaintance JL, Arnold L, Thompson GS : Development of an instrument to measure the climate of professionalism in a clinical teaching environment. *Acad Med* 2008; 83: S5-S8.
13. Gillespie C, Paik S, Ark T, Zabar S, Kalet A : Residents' perceptions of their own professionalism and the professionalism of their learning environment. *J Grad Med Educ* 2009 ; 1:208-215.
14. Arnold E, Blank L, Race K, Cipparone N : Can professionalism be measured. The development of a scale to be used in the medical environment. *Acad Med* 1998; 73:1119-1121.
15. Van Rosendaal GMA, Jennett PA :Resistance to peer evaluation in an internal medicine residency. *Acad Med*.1992 ; 67:63.
16. Ginsburg S, Regehr G, Hatala R, McNaughton N, Frohna A, et al. Context, Conflict, and Resolution: A new conceptual framework for evaluating professionalism. *Acad Med* 2000 ; 75: S6-S11.

Association of ABO blood groups with blood pressure in young male adults of Bhaktapur: A cross-sectional study

Kharel Sushil (1)
Raut Binod (2)
Gupta Rani (3)

(1) Department of Physiology, Kathmandu Medical College, Nepal

(2) Department of Pharmacology, KMCTH

(3) Professor and Head of Department, Department of Physiology, KMCTH, Nepal

Corresponding author:

Dr. Kharel Sushil

Department of Physiology,
Kathmandu Medical College,
Nepal

Email: drsushilkharel@gmail.com

Received: June 5, 2018; Accepted: July 17, 2018; Published: August 1, 2018

Citation: Sushil K. et al. Association of ABO blood groups with blood pressure in young male adults of Bhaktapur: A cross-sectional study. World Family Medicine. 2018; 16(8): 9-12. DOI: 10.5742MEWFM.2018.93482

Abstract

Background: The association between ABO blood groups and blood pressure has remained unclear. The present study aimed to assess the association between ABO blood groups and the blood pressure among the young male adult population of Bhaktapur, Nepal.

Methods and Materials: This was a cross-sectional study performed on 584 young male adults aged between 17 and 22 years. Two variables were noted from each individual: Arterial blood pressure and blood group. Chi-square test was used to find the relation between these two variables. P value < 0.05 is considered as statistically significant.

Results: The mean systolic blood pressure was significantly high in A blood group when compared to other blood groups (P value 0.04). The correlation between diastolic blood pressure and blood groups A, B, AB and O was not found. Moreover, association between blood pressure and Rhesus (Rh) blood group was not revealed.

Conclusion: Results of this study suggested that A blood group individuals have more susceptibility for high blood pressure indicating a potential risk of cardiovascular diseases with genetic relation between ABO blood group and hypertension. More and more studies in larger populations and different geographical areas are required to prove the correlation between ABO blood group and the blood pressure.

Key words: Blood group, Blood pressure, Hypertension

Introduction

Among numerous blood grouping systems, the ABO and Rhesus (Rh) blood grouping remain the most popular and clinically vital. Austrian scientist, Karl Landsteiner in 1901 named the first blood group in humans, which was the ABO blood group(1). Later, Rh blood group was introduced by Landsteiner and Wiener in 1941(2). The principle is that two antigens and two antibodies are responsible for the ABO types and a particular combination of these four types reveals an individual's ABO blood group. However, along with their expression on RBCs (Red Blood Cells), ABO antigens are also significantly presented on the surface of a variety of human cells and tissues, including neurons, platelets, and the different endotheliums(3). Thus, the medical importance of the ABO blood group system plays a vital role in modern medicine and numerous reports have suggested an important correlation between ABO blood groups and the development of various diseases such as cancers, diabetes, peptic ulcer and CVS diseases. Blood pressure is one of the vital signs routinely monitored by medical professionals and healthcare providers. Recent studies have revealed that cardiac disease is more commonly associated with people of blood type other than O (5). Most of the blood group studies on blood pressure have been on populations with preexisting hypertension(6). This study assessed the effect of ABO blood group on blood pressure and its prevalence among healthy young male adults of Bhaktapur, Nepal.

Methodology

The present study was conducted in the Department of Physiology of Kathmandu Medical College and Hospital after obtaining ethical clearance. It was a Cross-sectional study conducted in Bhaktapur from December 2016 to December 2017. The participation was totally voluntary. Informed written consent was taken from each participant before collecting any form of data. Demographic data and family history of any kind of disease was taken. After 10

minutes of resting, Blood Pressure (BP) was recorded twice in the left arm of each individual in sitting position; with 10 minutes interval between two recordings and mean value was taken. Blood pressure was recorded using a mercury Sphygmomanometer. The appearance (phase I) and disappearance (phase V) of Korotkoff sounds were considered for systolic and diastolic BP, respectively(7). Measurement of BP was done by the principal investigator to avoid bias. Individuals were divided into Normal, Prehypertensive and Hypertensive according to the guidelines by The Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC-VII)(8). For blood group determination, blood was collected from left ring-finger under aseptic precautions. ABO and Rh blood grouping were done by agglutination test using monoclonal anti-A, anti-B and anti-D (IgM) sera. Statistical analysis was done by using SPSS version 17. Chi-square test was used to know the association of ABO blood groups to blood pressure. 'P' value < 0.05 is taken as significant.

Results

The mean age of the study population was 19.56 ± 2.32 yrs (Mean \pm SD). It was found that blood group O (44.52%) was most prevalent in Bhaktapur, followed by blood group B (29.96 %), then group A (20.89 %), and least prevalent was group AB (4.63 %), shown in Table 1. In the Rhesus system, 95% of individuals were Rh(D) positive and only 5% were Rh(D) negative (Figure 3). The mean Systolic Blood Pressure (SBP) in A group is statistically significant with 'p' value of 0.04, and no significant difference in the mean Diastolic Blood Pressure (DBP) of ABO group (Table 1). In this present study the prevalence of prehypertension and hypertension was 32.78% and 14.67 % respectively. The prehypertensive and hypertensive individuals were counseled for further monitoring and evaluation. Table 2 indicates there is no significant association of increased blood pressure with AB, B and O blood groups, whereas A group shows a significant association (p value, 0.04) with elevated blood pressure.

Table 1: Distribution of ABO blood groups and mean blood pressure in the study population

| Blood Type | Number of Subjects (N) (Total =584) | Percentage | Mean SBP in mmHg (Mean \pm SD) | Mean DBP in mmHg (Mean \pm SD) |
|------------|--|------------|-------------------------------------|-------------------------------------|
| A | N= 122 | 20.89 % | 129.4 \pm 14.4 | 78.4 \pm 10.2 |
| B | N= 175 | 29.96 % | 122.3 \pm 11.6 | 74.24 \pm 9.3 |
| AB | N= 27 | 04.63 % | 121.4 \pm 10.5 | 76 \pm 10.40 |
| O | N= 260 | 44.52 % | 121.1 \pm 14.8 | 75.6 \pm 11.3 |

Table 2: Frequencies of ABO blood group in the study population (normal and elevated blood pressure)

| Blood Type | Subjects with normal BP (N=280) | Subjects with elevated BP (N=304) | P value |
|------------|---------------------------------------|---|---------|
| A | 35 | 87 | 0.04* |
| B | 90 | 85 | 0.9 |
| AB | 15 | 12 | 0.1 |
| O | 140 | 120 | 0.9 |

(*P value < 0.05)

Figure 1: Distribution of ABO blood groups in the study subjects

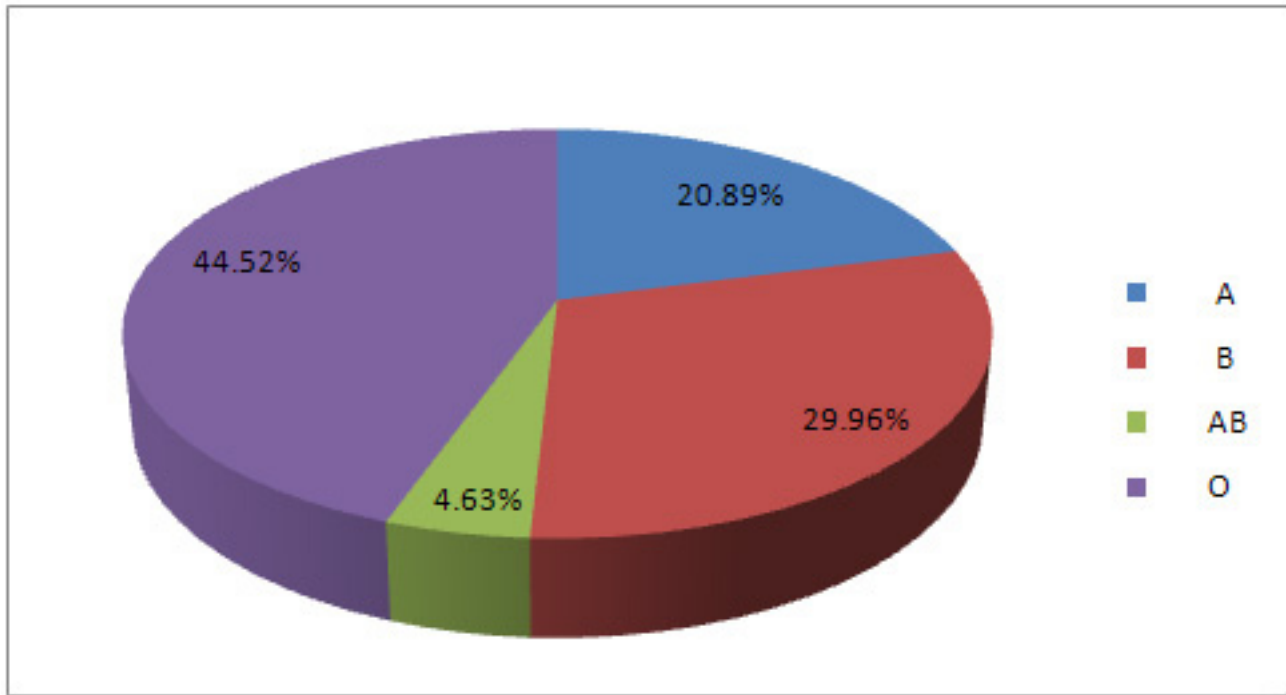
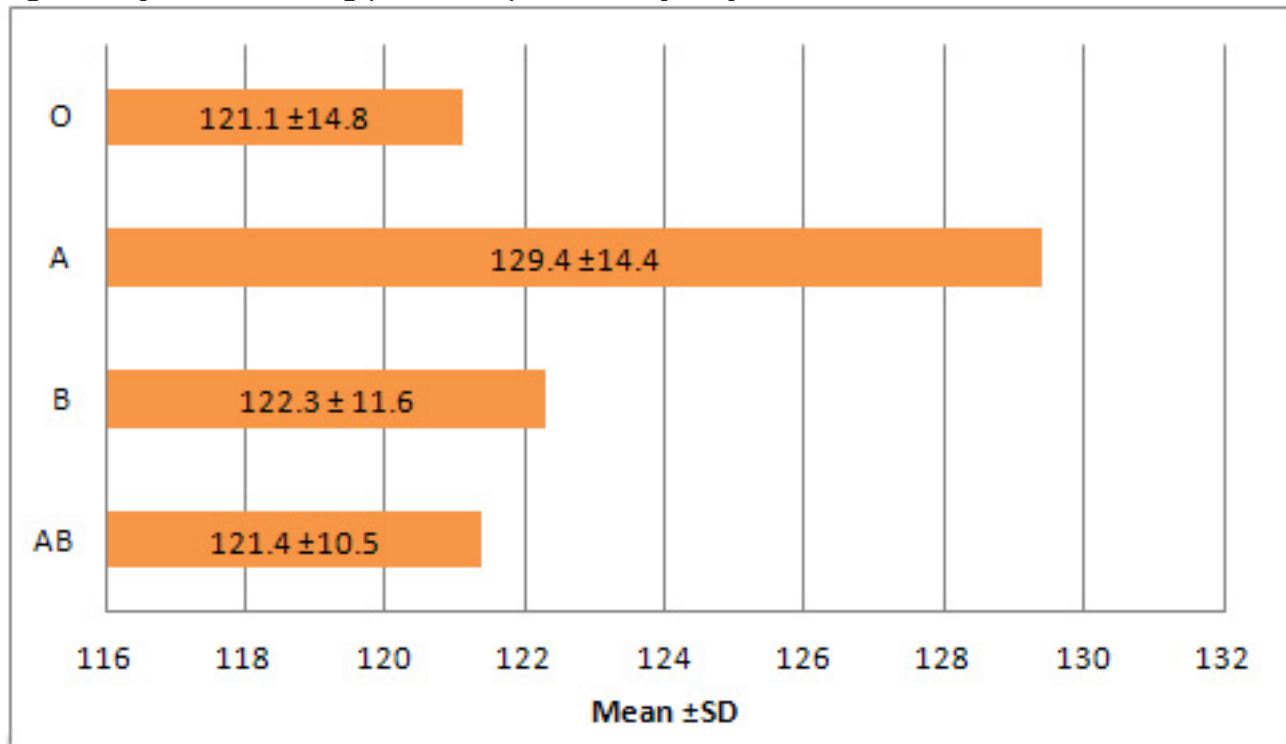
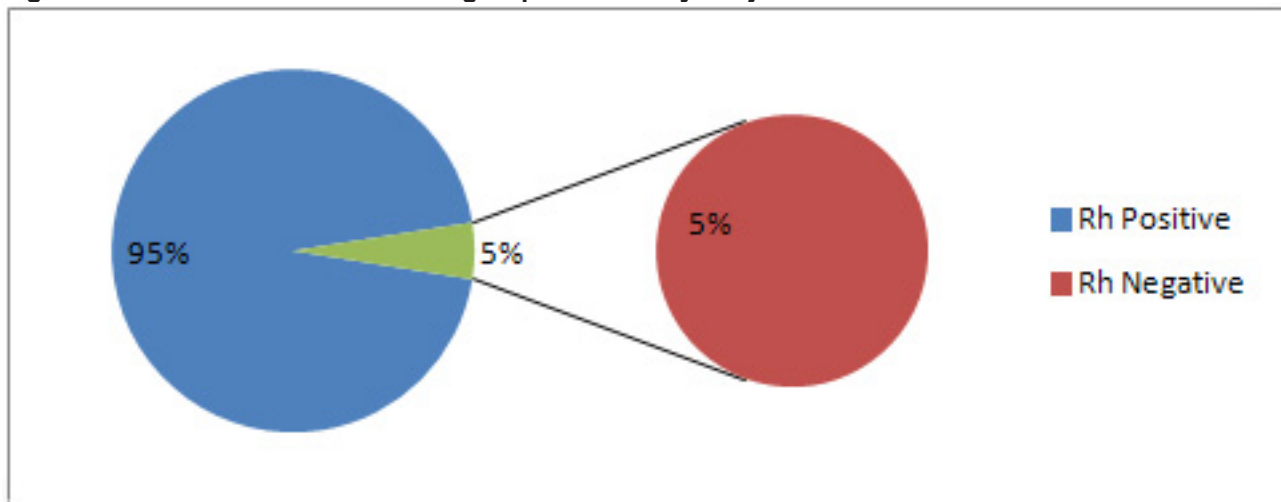
Figure 2: Systolic BP mmHg (Mean \pm SD) in the study subjects

Figure 3: Distribution of Rh D blood group in the study subjects

Discussion

The present study was comprised of 584 young male adults. Our study revealed that the individuals having blood group A (71.3%) have higher BP at baseline. Similar kind of association between A blood type and blood pressure was found in other studies; individuals with blood type A had a significantly greater risk of coronary artery disease and myocardial infarction, as compared to individuals who do not have type A blood group(9). In similar studies conducted by Maxwell it was found that the chances of hypertension in Glasgow were highest in blood group O patients (53.04%), followed by A (33.62%), then B (11.02%) and lowest was seen in blood group AB (2.32%)¹⁰. In a study done by Alam, no significant difference in systolic and diastolic blood pressure among all blood groups was seen(11). Our study clearly showed that A blood group is more susceptible to hypertension in comparison to other blood groups.

Conclusion

This study showed that blood group O (44.52%) is the most prevalent blood group in Bhaktapur. Frequency of occurrence of hypertension was found to be highest in blood group A. Previous studies have shown that relation between ABO and hypertension exists. Thus, from the present study also we can assume that the ABO antigens play an indirect role in influencing arterial blood pressure. However, further detailed studies with a wider geographical area and big study population is needed to justify the relation between blood group and blood pressure.

Acknowledgements

I express my deep sense of gratitude to my participants without their cooperation this study might not have been successful.

References

1. Garraty G, Dzik W, Issitt PD, Lubin DM, Reid ME, Zelinski T. Terminology for blood group antigens and genes-historical origins and guideline in the new millennium. *Transfusion* 2000; 40:477–89.
2. Rahman M, Lodhi Y. Frequency of ABO and Rhesus blood groups in blood donors in Punjab. *Pak J Med Sci* 2004; 20:315–8.
3. Eastlund, T. The histo-blood group ABO system and tissue transplantation. *Transfusion*, 1998. 38:975–88.
4. Franchini, M., E. J. Falavero., G. Targher. G. Lippi. ABO blood group, hypercoagulability, and cardiovascular and cancer risk. *Crit Rev Clin Lab Sci*, 2012. 49:137–49.
5. Biancari, F., J. Satta., R. Pokela, T. Juvonen. ABO blood group distribution and severity of coronary artery disease among patients undergoing coronary artery bypass surgery in Northern Finland. *Thromb Res*. 2002, 108: 195-6.
6. Faith CM, Arthur NA (2016) Study of Incidence and Prevalence of Hypertension, Diabetes and Obesity with Blood Type in Postmenopausal Females in Port Harcourt. *Saudi Journal of Biomedical Research* 1: 22-29.
7. National Clinical Guideline Centre (UK). Hypertension: The Clinical Management of Primary Hypertension in Adults: Update of Clinical Guidelines 18 and 34 [Internet]. London: Royal College of Physicians (UK); 2011 Aug [cited on 2016 Jan]. (NICE Clinical Guidelines, No. 127.) 6, Measuring blood pressure. Available from: <http://www.ncbi.nlm.nih.gov/books/NBK83269/>
8. Chobanian AV, Bakris GL, Black HR, Cushman WC, Green LA, Izzo JL Jr, Jones DW, Materson BJ, Oparil S, Wright JT Jr, Roccella EJ. Joint National Committee on Prevention, Detection, Evaluation and Treatment of High Blood pressure. *Indian Journal of Basic and Applied Medical Research*; June 2016: Vol.-5, Issue- 3, P. 8-13
9. H, Wazir, A.A. Rao, W. Joachim. Association Of Blood Group A With Increased Risk Of Coronary Heart Disease In The Pakistani Population. *Pak J Physiol*, 2005. 1:(1-2).
10. Maxwell R.D.H. and Maxwell K.N., ABO blood groups and hypertension, *BMJ*, 16, 179-180
11. Alam M., Wardell J. Anderson E., Effects of first myocardial infarction on left ventricular systolic and diastolic function with the use of mitral annular velocity determined by pulsed wave Doppler tissue imaging, *J Am Soc Echocardiogr*, 13, 343-352(2000)

Implications of Introducing Reflective Practice to the Family Medicine Residency Program in Qatar

Noora Al-Mutawa
 Mohamed H Mahmoud
 Saleh Attal
 Hisham Elmahdi

Family and Community Medicine Department,
 Primary Health Care Corporation,
 Qatar

Correspondence:

Hisham Elmahdi
 Family and Community Medicine Department,
 Primary Health Care Corporation,
 Qatar

Email: hzagalo@hotmail.com

Received: June 5, 2018; Accepted: July 17, 2018; Published: August 1, 2018

Citation: Noora Al-Mutawa, Mohamed H Mahmoud, Saleh Attal, Hisham Elmahdi. Implications of Introducing Reflective Practice to the Family Medicine Residency Program in Qatar World Family Medicine. 2018; 16(8): 13-21.

DOI: 10.5742MEWFM.2018.93483

Abstract

Background: Reflection is an essential and useful method used in medical education to enhance self-awareness, develop new understanding of experiences, as well as to examine one's own reasoning, analytical abilities and decision making skills. The department of family medicine, incorporated in October 2015, reflective case practice into the training curriculum for Family Medicine Residents.

Aim: Our main goal is to assess the implications of introducing reflective practice in Family Medicine Residency Program on residents' perceptions in Qatar.

Methods: In this action research, we used a cross-sectional study design. A purposive sample of 26(34) residents were recruited. Inclusion criteria: all current PGY1-PGY3 residents. PGY4 residents as well as residents who had finished the 4 years Training were excluded.

Results: The study included 26 residents from PGY-1, PGY-2 and PGY-3. More than 80% of respondents thought that the sessions were useful and enjoyable. Over 88% believed that the sessions boosted their interest in family medicine as a specialty and improved their patient care skills as they were positively influenced by exposure to others' experiences. However, 27% of the residents felt that they did not have enough time to reflect on their own experiences. The results generally showed significantly more positive influence on PGY-2 and PGY-3 compared to PGY-1 residents. On the other hand, the written reflective-based case assessments showed moderate levels of writing skills with slightly higher scores superiority for PGY-2 residents.

Conclusion: By enhancing reflective practice, family medicine residents will be able to improve their insight into their strengths and weaknesses, and develop an action plan to mitigate weaknesses and improve their case management in the future. This will help to improve competencies for a better Primary Care work force in PHCC .

Key words: Reflective practice, residents, Family medicine

Introduction

Reflection is an essential and useful method that has been used in medical education to enhance self-awareness, develop new understanding of the experience as well as to examine one's own reasoning, analytical abilities and decision making skills(1). Lewis et al. highlighted the value of reflective practice in the development of physicians(1). They explained that it ensues by engaging health care professionals in critical thinking to analyze their own performance and decision making in the learning process(1). Boud et al. defined reflective practice as *"Intellectual and affective activities in which individuals engage to explore their experience in order to lead to new understanding and appreciation (p. 19)"*(2).

Physicians are usually working in complex situations. In addition to addressing complex medical problems, the physician must also manage patients' and sometimes their own emotions along with empathy and appreciation. The ability to manage emotions is essential for physicians(3). Teaching residents how to reflect and facilitating their practice of reflection will aid their development into adaptable, lifelong learning professionals(4). Shaughnessy & Duggan argued that reflective practice augments the capacity for personal development of family medicine residents (4). In contemporary medical education institutions, reflection has been introduced at all levels of health professions education(5). Educational programs are putting in tremendous effort to discover effective strategies that promote reflection(6). A systematic review conducted by Mann et al. concluded that reflection may be most useful when viewed as a learning strategy, which helps learners integrate new learning to existing knowledge and skills. This may be mostly beneficial in the clinical learning environment, where many aspects of the professional role are experienced and learned(5). Furthermore, reflection provides an opportunity to determine one's strengths and weaknesses, and to consider learning needs and future action plans(5).

Reflecting on one's work is an essential component of family practice(6,7). Bethune & Brown studied the effect of reflective case based exercises on the learning of family medicine residents. They found that among participants, reflective learning exercises were effective for many issues that emerged in practice. They argued that written, reflective exercises can help to bridge the transition between clinical experience and current knowledge by encouraging thoughtful analysis and deeper understanding(6). It contributes to greater understanding of the patient-doctor relationship, and provides learners with personal insights as they develop as professionals(6). Family Medicine residency training requires long working hours and less time for rest and balance. Adding social pressure and some other factors made training programs search for the best practice to aid residents acquire a broad range of technical, cognitive, and emotional skills to gain professional competence. Reflective practice is one of the best ways to help residents achieve their goals. It was found that introducing reflective practice in many

residency training programs requires overcoming many obstacles from the extended working hours to overcoming the cultural resistance to creative activities that may still be perceived as less relevant to residency training(7). Bethune & Brown suggested that reflective activity would be further enhanced if the discussion was guided by trustful teacher and peers(6).

Methods

Setting

The Family Medicine Residency Program (FMRP) in Qatar is a 4-year program with a capacity of 10-12 new residents every year. The program is fulfilling the requirements of the Accreditation Council of Graduate Medical Education (ACGME) for the accreditation process. The goal of the ACGME outcome project is to ensure that programs assess each resident's mastery of six general competencies: medical knowledge, patient care, professionalism, interpersonal and communication skills, practice-based learning, and systems-based practice with a focus on outcomes evaluation (ACGME program requirements, 2007).

Intervention

The study took place from July 2015 to June 2016. To implement reflective practice in Family Medicine residency program, we introduced an orientation session about the reflective practice to the Family Medicine curriculum where all faculty and residents were expected to attend. During the session orientation about the nature of reflective practice a guide towards reflective cycle and reflective case-based activities was given. Gibb's cycle was adopted as a model of reflection. All residents are expected to choose a challenging case from the continuity of care clinic as they specify, reflect on it and discuss it in a specified session with peers and a faculty mentor. The faculty provides feedback on progress, covering strengths, exploring development needs and agreeing on action plans. The time given for case discussion presentation was 30 minutes and 30 minutes for reflection and discussion. At least 80% of residents were expected to discuss three reflective case-based activities with their Supervisors in the clinics, and 80% of all family medicine residents were to document at least four reflective writing essays in their portfolios. All residents who practiced reflection were to show improved awareness of the application of Practice-Based Learning and Improvement (PBLI) competency, particularly Self-directed learning and self-development as specified in residents self-assessment. Some of the data collection tools that were used in the study are mentioned below:

1. The first questionnaire contained demographic data of residents, and how frequently they applied reflective practice during the year. Close ended as well as open-ended questions were used. The questionnaire also contained a rating of the reaction of residents toward reflective case-based activities in a 1-5 Likert scale. The last part of the questionnaire was self-assessment questions on the application of PBLI competency in the domain of self-

directed learning. Piloting of the questionnaire was done. Residents were given 15 minutes chance to complete the survey questionnaire during duty hours and this was done by investigators at the end of the Academic year after completion of the required reflective practice activities.

2. The second questionnaire was a validated tool of reflective practice self-assessment adopted from Lawrence-Wilkes & A Chapman/Businessballs 2015(15). This was done by investigators at the end of the Academic year after completion of the required reflective practice activities.

3. The third tool for data collection was the assessment of residents' portfolios, how many reflective writings were achieved by the end of the year (Goal 4/year) and were graded for depth of reflection by using Bradley's Criteria for assessing levels of reflection (16). Portfolios were assessed by two investigators twice during the study to monitor progress and the results at the end of the academic year were considered.

Design

In this action research, we used a cross-sectional study design. 30 residents were invited to the study and 26 residents accepted to participate and signed a waiver of a consent form. A purposive sample of 26 residents was recruited. Inclusion criteria: all current PGY1-PGY3 residents. PGY4 residents, as well as residents who had finished the four years training, were excluded.

Analysis

The data was analysed on two levels; the first level was a descriptive analysis of the respondents' background characteristics and their responses to the questions in the residents' survey questionnaire. Then, the analysis was taken further using Fisher's exact test to analyse the difference between the different PGYs with regards to their responses in the same questionnaire. The scores for the written reflective-based case were analysed using scale line graphs for the mean scores of each PGY level fitted against the temporal sequence of the four written cases. The data was analysed using Stata intercool 9.0 software.

Results

The goal of this study was to assess the implications of introducing reflective practice in Family Medicine Residency Program on residents' perceptions in Qatar. The study had used multiple sources of information to reach that aim. Starting with the residents' survey questionnaire; there were 26 responders. As shown in Table 1, there were 7 residents from PGY-1, 10 from PGY-2 and 9 from PGY-3. Almost half of the residents (52.2%) were younger than 30 years old. The number of males was slightly higher compared to females (15 and 11, respectively). About 56% of the respondents reported weekly hours of more than 60.

Table 1: Sociodemographic Characteristics of Participants

| Characteristic | No. | % |
|-----------------------------|-----|------|
| Postgraduate Year | | |
| PGY – 1 | 7 | 26.9 |
| PGY – 2 | 10 | 38.5 |
| PGY – 3 | 9 | 34.6 |
| Age Groups | | |
| < 30 years | 12 | 52.2 |
| >= 30 years | 11 | 47.8 |
| Gender | | |
| Male | 15 | 57.7 |
| Female | 11 | 42.3 |
| Weekly working hours | | |
| <= 60 hours | 11 | 44.0 |
| > 60 hours | 14 | 56.0 |

Abbreviations: PGY: Post-Graduate Year

The residents were asked to answer questions related to their experience in presenting reflective cases. From Table 2, it is clearly seen that all (100%) of the 26 residents participated in reflective-based practice during the academic year and all of them presented at least one reflective-based case. Twenty-four (92.2%) residents agreed that physicians should reflect upon their practice. With exception of only one resident (who did not respond), the rest of them were willing to participate in reflective practice in the future. Moreover, 24 (92.2%) residents agreed that engaging in reflective practice would have an impact on the quality of patient care; with 23 of them agreeing that by engaging in reflective practice they would be more inclined to learn throughout their career.

Table 2: Residents' response to questions regarding their experience with reflective case presentations (N=26)

| | YES | Percentage |
|---|------|------------|
| Did you participate in reflective practice in this academic year? | 26 | 100 |
| Did you present any reflective-based case during this academic year? | 26 | 100 |
| Would you recommend that all physicians reflect upon their practices? | 24 | 92.3 |
| Are you willing to engage in any form of reflective practice in the future? | 25 | 100 |
| Do you think engaging in reflective practice would have any impact on the quality of patient care you or your colleagues provide? | 24 | 92.3 |
| Do you think by engaging in reflective practice you will be more or less inclined to learn throughout your career? | 23 * | 88.5 |

*Think they will be more inclined

Table 3 describes the residents' responses regarding reflective-based case discussion sessions. From the table, more than 80% thought that the sessions were enjoyable and that the sessions boosted their interest in the specialty. More than 88% thought that they were useful, improved their patient care and that exposure to others' experiences had positively influenced them. However, around 19 (73%) residents thought that they had enough time to reflect on their experiences.

Table 3: Residents' responses regarding reflective-case based discussion (N= 26)

| Question | Strongly disagree count (%) | Disagree count (%) | Neutral count (%) | Agree count (%) | Strongly agree count (%) |
|--|-----------------------------|--------------------|-------------------|-----------------|--------------------------|
| The sessions were enjoyable | - | 2 (7.7) | 3 (11.5) | 11 (42.3) | 10 (38.5) |
| The sessions were useful | - | 2 (7.7) | 1 (3.9) | 11 (42.3) | 12 (46.1) |
| The sessions boosted my interest in the specialty | - | 1 (3.9) | 4 (15.4) | 13 (50.0) | 8 (30.7) |
| The sessions have improved my patient care | - | - | 4 (15.4) | 13 (50.0) | 10 (38.6) |
| Exposure to others' experiences has positively influenced me | - | - | 3 (11.5) | 13 (50.0) | 10 (38.5) |
| I had enough time to reflect on my experiences | 2 (7.7) | 2 (7.7) | 3 (11.5) | 11 (42.3) | 8 (30.8) |

No missing data

Table 4: Residents' responses regarding reflective-case based discussion by PGY level (N= 26)

| <i>Question</i> | PGY-1 Mean \pm SD | PGY-2 Mean \pm SD | PGY-3 Mean \pm SD | P-value |
|--|------------------------|------------------------|------------------------|-----------|
| The sessions were enjoyable | 3.4 (1.3) | 4.6 (0.7) | 4.1 (0.3) | 0.025 * |
| The sessions were useful | 3.4 (1.1) | 4.7 (0.5) | 4.4 (0.5) | 0.005 * |
| The sessions boosted my interest in the specialty | 3.4 (1.0) | 4.5 (0.5) | 4.1 (0.6) | 0.017 * |
| The sessions have improved my patient care | 3.4 (0.5) | 4.6 (0.5) | 4.6 (0.5) | < 0.001 * |
| Exposure to others' experiences has positively influenced me | 3.6 (0.5) | 4.6 (0.5) | 4.4 (0.5) | 0.002 * |
| I had enough time to reflect on my experiences | 2.9 (1.1) | 4.6 (0.5) | 4.1 (0.6) | < 0.001 * |

Abbreviations: SD: standard Deviation, PGY: Post-Graduate Year

*P-value significant (< 0.05)

The analysis was taken further to assess the disparity between different PGY levels regarding the reflective-based practice. From Table 5 (next page) it is clearly seen that residents in PGY-1 were significantly showing lower scores compared to senior PGY levels in enjoying the sessions, usefulness of the sessions, boosting their interest in the specialty, effect on improvement of their patient care, influence of exposure to others' experiences and whether they had enough time to reflect on their practice. Moreover, on the same queries, PGY-2 residents had statistically significant higher scores compared to PGY-3.

The residents' survey questionnaire included further questions regarding the application of practice-based learning and improvement to assess the implications of reflective practice on that competency. From Table 4, most of the residents (at least 92%) agreed that they identified strengths, deficiencies, and limits in their knowledge and expertise, they set learning and improvement goals, they identified and performed appropriate learning activities to guide personal and professional development, they systematically analyzed practice using quality improvement methods and implemented changes with the goal of practice improvement, they incorporated formative evaluation feedback into daily practice, they located, appraised, and assimilated evidence from scientific studies related to patient's health problems, they used information technology to optimize learning and care delivery, they developed their skills to be effective teachers, they participated in the education of patients, families, students, residents, and other health professionals and that they took primary responsibility for lifelong learning to improve knowledge, skills and practice performance.

Table 5: Residents' responses regarding application of practice-based learning and improvement (N= 26)

| Statement | Mostly Count (%) | Often Count (%) | Sometimes Count (%) | Rarely Count (%) |
|---|-----------------------------|--------------------------------|--------------------------------|---------------------------------|
| I identified strengths, deficiencies, and limits in my knowledge and expertise | 8 (30.8) | 17 (65.4) | - | 1 (3.8) |
| I set learning and improvement goals | 12 (46.2) | 7 (26.9) | 6 (23.1) | 1 (3.8) |
| I identify & perform appropriate learning activities to guide personal & professional development | 9 (34.6) | 13 (50.0) | 4 (15.4) | - |
| I systematically analyze practice using quality improvement methods & implement changes with the goal of practice improvement | 4 (15.4) | 14 (53.8) | 6 (23.1) | 2 (7.7) |
| I incorporate formative evaluation feedback into daily practice | 10 (38.5) | 9 (34.6) | 7 (26.9) | - |
| I locate, appraise, and assimilate evidence from scientific studies related to patient's health problems | 12 (46.2) | 12 (46.2) | 2 (7.6) | - |
| I use information technology to optimize learning and care delivery | 16 (61.5) | 9 (34.6) | 1 (3.9) | - |
| I develop my skills to be an effective teacher | 13 (50.0) | 11 (42.3) | 2 (7.7) | - |
| I participate in the education of patients, families, students, residents, and other health professionals | 18 (69.2) | 4 (15.4) | 4 (15.4) | - |
| I take primary responsibility for lifelong learning to improve knowledge, skills & practice performance | 17 (65.4) | 9 (34.6) | - | - |

Table 6 shows the differences in residents' scores by their PGY level regarding the implications of reflective practice on the application of practice-based learning. The table shows a higher score for PGY-2 compared to PGY-1 and PGY-3, however, these results were statistically significant only in their response of whether they agreed that reflective-based practice had helped them to set learning and improvement goals, identify and perform appropriate learning activities to guide personal and professional development, systematically analyze practice using quality improvement methods and implement changes with the goal of practice improvement and develop their skills to be an effective teacher.

The response rate for PGYs in written reflection:

- PGY1 out of 7 residents with 4 cases expected for each one (Total 28) we had 27 cases available
- PGY2 out of 10 residents with expected 4 cases for each one (Total 40); we had none missing
- PGY3 out of 9 residents with expected 4 cases for each one (Total 36); we had only 30 cases

When assessing the written reflective-based cases every resident was required to write at least 4 cases in the academic year and to submit it in the resident portfolio. The assessment scores of these cases are presented in Figure 1 which shows three graph lines representing the mean score for each PGY which are fitted against the temporal sequence of the 4 cases. It can be clearly seen that PGY-2 had higher score level compared to PGY-1 and PGY-3. In addition to that, the scores of PGY-3 were higher initially than that of PGY-1 with an almost similar score in the last written case. The graph generally shows no improvement, if no change, when comparing case 4 to case 1. However, there was no sharp incline in the score levels.

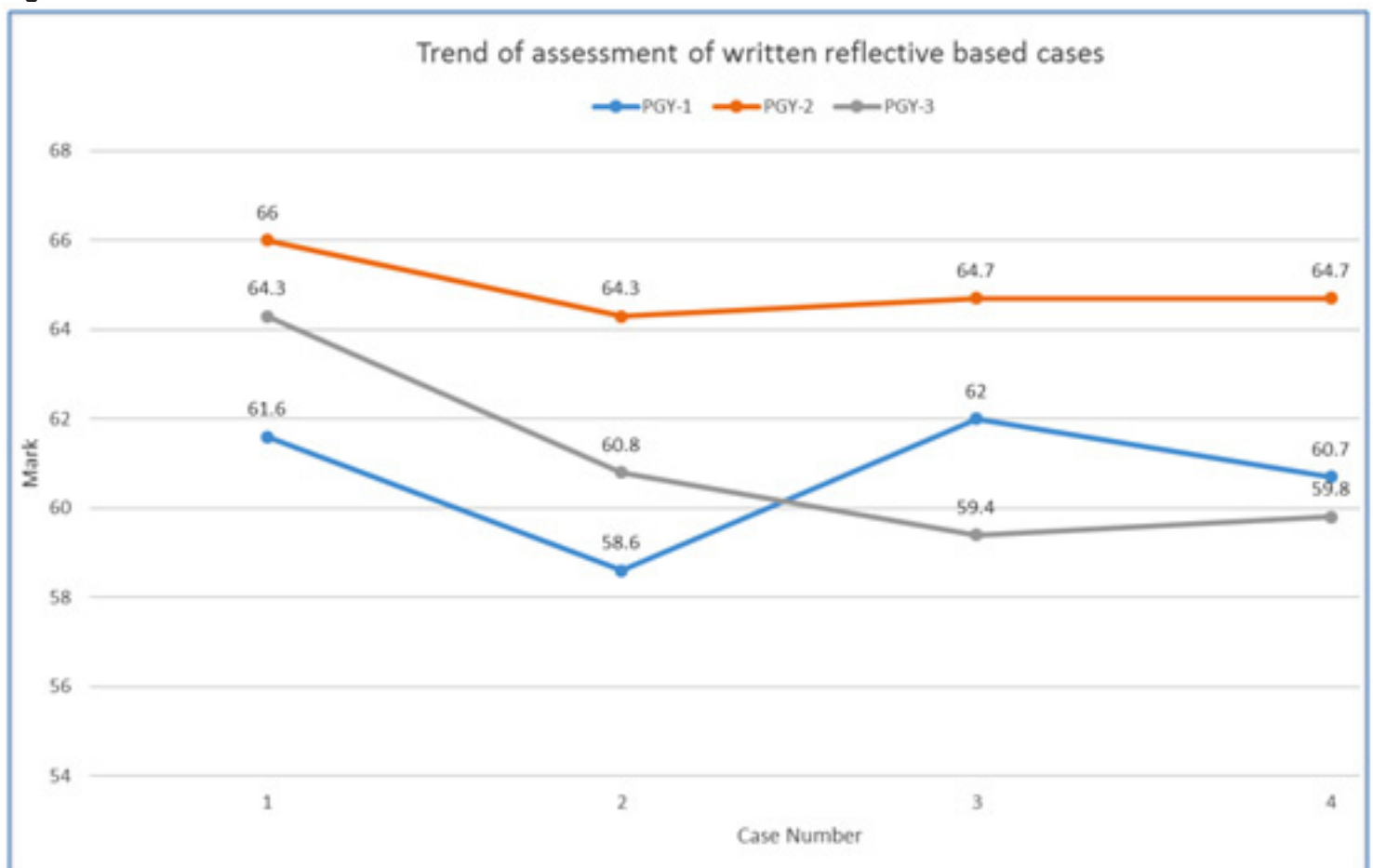
Table 6: (N= 26)

| Statement | PGY-1 | PGY-2 | PGY-3 | P-value |
|---|---------------|---------------|---------------|---------|
| | Mean \pm SD | Mean \pm SD | Mean \pm SD | |
| I identified strengths, deficiencies, and limits in my knowledge and expertise | 3.1 (0.4) | 3.3 (0.9) | 3.2 (0.4) | 0.894 |
| I set learning and improvement goals | 2.3 (0.5) | 3.4 (1.0) | 3.6 (0.7) | 0.008 * |
| I identify & perform appropriate learning activities to guide personal & professional development | 2.6 (0.5) | 3.5 (0.5) | 3.3 (0.7) | 0.012 * |
| I systematically analyze practice using quality improvement methods & implement changes with the goal of practice improvement | 2.1 (0.9) | 3.2 (0.8) | 2.8 (0.4) | 0.024 * |
| I incorporate formative evaluation feedback into daily practice | 3.1 (0.9) | 3.1 (1.0) | 3.1 (0.6) | 0.995 |
| I locate, appraise, and assimilate evidence from scientific studies related to patient's health problems | 3.1 (0.9) | 3.6 (0.5) | 3.3 (0.5) | 0.345 |
| I use information technology to optimize learning and care delivery | 3.4 (0.8) | 3.8 (0.4) | 3.4 (0.5) | 0.309 |
| I develop my skills to be an effective teacher | 2.9 (0.4) | 3.8 (0.4) | 3.4 (0.7) | 0.007 * |
| I participate in the education of patients, families, students, residents, and other health professionals | 3.1 (0.9) | 3.8 (0.6) | 3.6 (0.7) | 0.220 |
| I take primary responsibility for lifelong learning to improve knowledge, skills & practice performance | 3.4 (0.5) | 3.8 (0.4) | 3.7 (0.5) | 0.310 |

Abbreviations: SD: standard Deviation, PGY: Post-Graduate Year

*P-value significant (< 0.05)

Figure 1: Trend of written reflective based cases



Discussion

Summary of findings

In this study, we introduced reflective practice to the family medicine residency program. This was done through reflective case-based activities which were introduced to the curriculum and helped residents to reflect on challenging cases they face in the clinic through facilitated discussion with their peers and supervising faculty. The majority of the residents found these sessions enjoyable, useful, improved their care of patients and boosted their interest in the specialty and the results were statistically significant (P -value <0.5). However, a less percentage of residents found enough time to reflect (73%, P -value <0.001). As residents self-assessed themselves in practice-based learning and improvement competencies as specified by ACGME framework, and in comparison to the results from 3 PGY levels, it was found that there was a significant difference in PGY3 in setting learning and improvement goals. And PGY2 had better implementation of identifying and performing appropriate learning activities to guide personal and professional development, systematically analyze practice using quality improvement methods and implement changes with the goal of practice improvement and developing skills to be an effective teacher. Other competencies in PBLI, while sufficiently implemented, did not have a significant difference between PGY levels.

The percentage of submission of reflective essays was good; the investigators used Bradley's criteria to comment on the depth of reflective writing in students' reflections. The mean average scores were considered for each PGY level. PGY2 had the best scores followed by PGY3 then PGY1. By the submission of the 4th reflective essay, the score of PGY3 declined even below PGY1 level.

Comparison with other studies

In a previous study on Family medicine resident's reaction to introducing a reflective exercise into training, Shaughnessy & Duggan [4] found that residents agreed that reflection is a method to improve personal and professional development. Although they had a different approach to reflection in their study, they asked residents to write a short reflective entry three times a week, and similar to our study, residents found it difficult to find time to reflect, and there were time conflicts with other professional duties. Also, they emphasized the importance of providing a structure to residents in reflection. We found the implementation of a reflective model such as Gibb's provided structure for residents and the reflective case-based discussions with peers and faculty which the residents enjoyed and found useful and helped them to improve self-awareness and implement an action plan for improvement with the help of faculty and peer to peer discussion.

In another study of family medicine residents' perception to introducing reflective case-based activity, Bethune & Brown [6] found that the reflective activities improved residents personal insight, discussion with mentors and peers provided more exploration of concepts, refinement of new

concepts and implementing it in practice and their maturation as professionals. Also, time to reflect was raised as a potential factor for the success of the reflective practice.

Mamede & Schmidt [18] have proposed two important aspects to reflective practice, the willingness to engage in reflective activity and critically reviewing one's own assumptions regarding a situation or a problem 'meta-reasoning'. The residents in our study have explored enthusiasm for the reflective practice, and that was obvious in the better scoring of PGY2 residents in the reflective writing. They explained that better understanding of the thinking process and providing a structure to reflective practice in medicine would lead to a well-designed educational curricula that can be taught. It is assumed that doctors who are involved in reflective practice have better self-awareness, clinical reasoning and consequently, better patient care. Winkel et al. [7] have introduced a reflective writing workshop series to the curriculum of Obstetrics and Gynecology Training program; residents found the reflective sessions enjoyable, time to reflect was also emphasized and the availability of faculty members who are dedicated to teaching reflective practice.

Strengths

More than one assessment tool. The improvement in residents' reflective abilities is expected to have many implications. In the short term, improvement of residents' knowledge and skills about reflective practice will help them to fulfill ACGME-I requirements and improve residents' skills in reflective writing and documentation in their portfolios. In the medium-term engagement of residents in reflective practice helped them to develop a new understanding of the difficult situation; it will improve their awareness of their strengths and weaknesses and how to develop a new action plan for the better care of their patients. And in the long-term, it is expected that residents will have improved decision making and patient care competencies to optimize the residents' chances for career success in primary care practice, which will be reflected in the provision of high-quality services to the wider community. Longer term studies are required to elicit this effect.

Weaknesses

Small size study and in one setting, which would limit the generalizability of results. To compare residents performance before and after intervention to detect the difference.

The results depends on the students perceptions, a better understanding of student's performance in case based discussion and PBLI would be by using faculty supervisor feedback as another tool

Recommendations for future research

Whether involvement in reflective practice will lead to better patient outcomes, requires longer term studies. Longer term studies are required to detect sustainability.

Conclusion

By enhancing reflective practice, family medicine residents will be able to improve their insight into their strengths and weaknesses, and develop an action plan to mitigate weaknesses and improve their case management in the future. This will help to improve competencies for a better Primary Care work force in PHCC.

Ethical Consideration

The author obtained approval from the institutional review board at Primary Health Care Corporation, reference number (PHCC/RC/). Residents were asked to sign a waiver of consent form.

Acknowledgments

Disclosure statement

No potential conflict of interest was reported by the authors.

Funding

This work was supported by the Primary Health Care Corporation (PHCC/RC/).

References

- Lewis K, Peska D, Farber S & Chen H. Learning through reflection: reflective practices in an online course. (2014). Retrieved on 30th Dec 2015, from: <http://olc.onlinelearningconsortium.org/conference/2014/aln/learning-through-reflection-reflective-practices-online-course>
- Boud, D., Keogh, R. & Walker, D. (1985) p 43 Reflection: Turning Experience into Learning. London: Kogan Page.
- Basic components of the reflective practice and leadership method. Retrieved from (4th Jan 2016): <http://txch.org/education/reflective-practice-leadership/basic-components-rpl-method-overview/>
- Shaughnessy AF, Duggan AP. Family medicine residents' reactions to introducing a reflective exercise into training. *Educ Health* 2013;26:141-6.
- Mann K, Gordon J, MacLeod A. Reflection and reflective practice in health professions education: A systematic review. *Adv Health Sci Educ Theory Pract* 2009;14:595-621.
- Bethune C & Brown J. Resident's use of case-based reflection exercises. *Can Fam Physician*,2007;53:470-476.
- Winkel A, Hermann N, Graham M Ratan R. No time to think: making room for reflection in obstetrics and gynecology residency, *J Grad Med Educ*. 2010 Dec;2(4):610-5. 1
- Lockyer J, Gondocz T, Thivierge R. Knowledge translation: the role and place of practice reflection. *J Contin Educ Health Prof* 2004;24:50-6. 11.
- Bruke A, Benson B, Englander R, Carraccio C & Hicks P. Domain of Competence: Practice Based Learning and Improvement. *Academic Pediatrics* 2014; 14:S38-S54.
- Hafferty F. Beyond curriculum reform: confronting medicine's hidden curriculum. *Acad Med* 1998;73:403-7. 16.
- Sons; 2001. p. 19-26.
- Schon, D. (1983). *The reflective practitioner*. San Francisco: Jossey-Bass.
- Hiemstra R. Uses and benefits of journal writing. In: English LM, Gillen MA, editors. *Directions for adult and continuing education*. New York, NY: John Wiley and Sons; 2001. p. 19-26.
- Schon, D. (1983). *The reflective practitioner*. San Francisco: Jossey-Bass.
- Boud, D., & Walker, D. (1998). Promoting reflection in professional courses: The challenge of context. *Studies in Higher Education*, 23(2), 191–206.
- Epstein, R., & Hundert, E. (2002). Defining and assessing professional competence. *JAMA*, 287, 226–235.
- Retrieved from: www.businessballs.com/reflective-practice.htm. Sole risk with user. Based on Lawrence-Wilkes' Art of Reflection Quiz, Lawrence Wilkes & Ashmore, *The Reflective Practitioner in Professional Education*, 2014.
- Bradley J (1995) A model for evaluating student learning in academically based service, connecting cognition and action. In Troppe M (Ed.) *Evaluation of student performance in service learning courses*. Education Commission of the States/Campus, Denver, cited in Bringle RG & Hatcher JA (1999) *Reflection in service learning: making meaning of experience*. *Educational Horizons*, Summer: 179-185.
- ISCP Guidance notes on using the Reflective CBD. Retrieved on 7th Jan 2015 https://www.iscp.ac.uk/static/public/reflective_cbd_guidance.pdf
- Mamede S, Schmidt H. The structure of reflective practice in medicine. *Medical Education* 2004; 38: 13021308.

Anti-Fatigue and Hypnotic Effects of a Traditional Herbal Extract on Multiple Sclerosis Patients: A double blind randomized clinical trial

Maryam Adalat (1)
Mohammad Khalili (2,3)
Hormoz Ayromlou (2,4)
Sajjad Haririan (5)
Hossein Rezaeizadeh (6)
Ali Akbar Safari (7)
Arman Zargaran (7)

(1) Department of Traditional Medicine, School of Traditional Medicine, Tabriz University of Medical Sciences, Tabriz, Iran.

(2) Neurosciences Research Center; Tabriz University of Medical Sciences, Tabriz, Iran.

(3) Multiple Sclerosis Research Center, Tehran University of Medical Sciences, Tehran, Iran.

(4) Department of Neurology, Tabriz University of Medical Sciences, Tabriz, Iran.

(5) Department of Neurology, Alinasab Hospital, Tabriz, Iran.

(6) Department of Traditional Medicine, School of Persian Medicine, Tehran University of Medical Sciences, Tehran, Iran.

(7) Department of Traditional Pharmacy, School of Persian Medicine, Tehran University of Medical Sciences, Tehran, Iran.

Corresponding author:

Hossein Rezaeizadeh, PhD,

Department of Traditional Medicine, School of Persian Medicine, Tehran University of Medical Sciences, Tehran, Iran.

Tel: +98216312374;

Email: rezaeizadeh@sina.tums.ac.ir

Received: April 30, 2018; Accepted: May 15, 2018; Published: August 1, 2018

Citation: Salem M, Al-Ali A, Alm-Mutawaa N, Yousuf W, Almansouri N. Professionalism in Family Medicine Residency Program in Qatar. *World Family Medicine*. 2018; 16(8): 22-31. DOI: 10.5742MEWFM.2018.93484

Abstract

Objectives: Multiple Sclerosis (MS) is a chronic inflammatory and neurodegenerative disorder of the central nervous system. The aim of this study was to investigate the effects of a Persian herbal medicine treatment including *Crocus sativus*, *Hypericum perforatum*, *Cinnamon verum*, and *Vitis vinifera* on fatigue and sleep disorders in MS patients.

Methods: In this controlled, double-blinded, clinical trial, 52 patients with MS suffering from fatigue or sleep disorders were randomly divided into two groups (herbal remedy or the placebo). Fatigue symptoms were quantified by means of Fatigue Severity Scale (FSS) and Modified Fatigue Impact Scale (MFIS). The Insomnia Severity Scale (ISI) and Pittsburgh Sleep Quality Index (PSQI) were used to assess sleep difficulties.

Results: There was a significant reduction in FSS and MFIS scores in both groups, but the mean change rate in FSS and MFIS scores in the drug group was significantly higher compared to the placebo group. In both the drug and placebo groups, ISI and PSQI scores decreased significantly after four weeks, but the change rate in ISI and PSQI scores in the drug group was significantly more than the placebo group ($p=0.00$).

Conclusion: The present study suggests that herbal extract treatment may improve sleep disorder and fatigue symptoms in MS patients. Further investigations are needed to know the exact mechanism of actions.

Key words: Persian medicine, multiple sclerosis, fatigue, sleeps disorder, herbal extract

Introduction

Multiple Sclerosis (MS) is a chronic inflammatory disorder of the central nervous system with physical and psychiatric comorbidities that affect the quality of life in these patients [1-3]. Several studies have suggested that psychiatric disorders, such as sleep disorders, are noted to occur more frequently in MS patients than in the general population, and that there is a significant correlation between sleep disturbances and fatigue [4, 5]. Several types of sleep disorders including insomnia, nocturnal movement disorders, sleep-disordered breathing and restless legs syndrome have been reported in patients with MS, which may affect their daily functions [4]. It is by noting the high prevalence of sleep disorders in MS patients, which amounts to almost 50% of them, and their role in exacerbating other symptoms of the disease, that the treatment of sleep disorders gains immediate importance [6].

Fatigue is one of the most common problems in MS patients; 67% of patients experienced fatigue as the most disabling symptom. The symptoms of fatigue may be acute and intermittent or chronic and persistent [5, 7, 8]. A number of different factors may affect fatigue in MS patients, including heat, pain, depression, stress and sleep disorders [9]. Although fatigue is reported by approximately 75% to 90% of patients with MS, there is still some difficulty and complexity in its management [10].

Various management strategies (pharmacological agents, exercise and behavioural therapy) have been used for its treatment, but the outcomes are not promising [10, 9]. For this reason, there has been special interest emerging to identify other management strategies to overcome fatigue and sleep disorders in MS patients, such as herbal medicine [11, 12]. It is believed that herbal medicine has fewer side effects in comparison to pharmacological agents, and they can be used as an alternative therapy to increase the effect of prescription medications [13].

To find new herbal compounds with hypnotic and anti-fatigue properties, the herbal plants were selected on the basis of Persian medicine for the treatment of sleep disorders and fatigue. Various herbal compounds have been used for treating different neuropsychiatric disorders in Persian traditional medicine. In this study a Persian compound medicine was made and evaluated, that is derived from the book of Makhzan al-Advieh (storehouse of medicaments), written by Aghili Khorasani, the Persian physician in the 18th century; under the title of Anis-al-Nafs (C). This formulary includes the medicinal plants itemised below.

A spice derived from dried stigma of Saffron (*Crocus sativus* L.; family of Iridaceae), has traditionally been used as a sedative and hypnotic agent to prevent insomnia [14]. The main bioactive metabolites of saffron spice are crocins, picrocrocin and safranal, which have anti-inflammatory, antioxidant and radical scavenging properties [15]. Hosseinzadeh and Nouraei (2009) investigated the anxiolytic and hypnotic effects of saffron aqueous extract

in mice. Their results showed that saffron, at a dose of 0.56 g/kg, significantly improved sleep in mice, a hypnotic effect mostly attributed to safranal [16]. Also, St John's wort (*Hypericum perforatum* L.) is another plant from the Hypericaceae family that has been used in traditional medicine as an antidepressant for the treatment of mild to moderate depression [17]. Another observation was the beneficial effect of St John's wort treatment on psychiatric and neurological disorders such as Alzheimer's disease (AL), Parkinson's disease (PD) and experimental allergic encephalomyelitis (EAE), an animal model of MS [17, 18]. Hyperforin is one of the main bioactive constituents of St John's wort that exerts anti-inflammatory, antioxidant and antibacterial action, along with antidepressant effects [19]. Current investigations show the probable role of anti-inflammatory and antioxidant properties to control pain, fatigue, sleep disturbance, and depression [20, 21].

On the other hand, new evidence suggests that cinnamon, the brown bark of the cinnamon tree (*Cinnamomum verum* J. Presl; from the family of Lauraceae), may be used to control EAE via different mechanisms. Cinnamaldehyde is the main constituent of cinnamon, which is converted into cinnamic acid by oxidation. Cinnamic acid is then β -oxidized to benzoate in the liver and is made available as sodium salt (sodium benzoate). Several studies have shown the beneficial effects of cinnamon and its metabolite, sodium benzoate, in treating different neurodegenerative disorders such as Alzheimer's disease, Parkinson's disease and MS [22, 20, 21]. The grape (*Vitis vinifera* L.; from the family of Vitaceae) is a fruit with neuroprotective properties, due to its bioactive components in the seed and skin [23, 24]. Polyphenols from grape seeds, especially proanthocyanidins, have antioxidant and anti-fatigue functions. Shan et al. (2010) showed that grape seed proanthocyanidin extract (GSPE) increased the liver and muscle glycogen reserve, delayed the occurrence of fatigue and improved the exercise capacity in mice [25]. In a study by Edwards et al, the administration of pure anthocyanidins derived from grape seed, bilberry and cranberry, improved sleep quality and fatigue in patients with fibromyalgia disorders [26]. Xie et al showed that GSPE has an anti-fatigue effect through increasing hemoglobin and hepatic glycogen and decreasing blood lactic acid concentration in mice [27]. Resveratrol is another polyphenolic compound in red grapes which has antioxidant, anti-inflammatory and neuroprotective effects [28]. Several studies have demonstrated its potential use in the treatment of inflammatory and autoimmune diseases including MS [29]. Resveratrol maintains the blood brain barrier integrity and can promote remyelination in animal models of MS [30, 31]. Wu et al studied the effect of resveratrol on physical fatigue and exercise performance in mice. They found that resveratrol treatment decreased serum lactate and ammonia levels and increased glucose levels in a dose-dependent manner [32].

The present study was undertaken to test the anti-fatigue and hypnotic effects of Persian herbal medicine (including *C.sativus*, *H.perforatum*, *C.verum*, and *V.vinifera*) in MS patients, using a double blind, randomized, placebo controlled trial design.

Material and Methods

Study design and ethical issues

This study was a one-month parallel group, placebo controlled trial undertaken from March 2017 to October 2017 in Sina Hospital in Tabriz, Iran. The trial was approved by the Ethics Committee of Tabriz Medical University (TBZMED.REC.1394.884) and registered in Iranian Clinical Trial Registry (IRCT2016012916369N3). Also, written informed consent was obtained from each patient before enrolment.

Drug and Placebo

The plants of St John's wort (Voucher No. PMP-389) and cinnamon (Voucher No. PMP-913) and also grape syrup were purchased from a traditional herbal store (Attari) in Tehran and their identification and quality control were done in the Herbarium Center of School of Pharmacy, TUMS. Also, the standard saffron (Saharkhiz Co.) was used in the study.

Each 10 milliliter of the herbal extract contained the extracts of 64 mg saffron, 357 mg cinnamon and 857 mg St John's wort which was supplied via maceration, Soxhlet, and Clevenger (for both aqueous extract and essential oil), respectively in 4.3 ml grape syrup. The rest of 10 ml had about 2g sugar and also distilled water. The placebo was simple syrup and 0.71 ml grape syrup and 0.1% St John's wort essential oil to reach a similar color and smell to the drug. The herbal extract and placebo were prepared in the Department of traditional pharmacy, School of traditional medicine, Tehran University of Medical Sciences.

Standardization of drug based on total flavonoid and total phenol

Standardization of the drug was performed with a spectrophotometric method. In this method total poly phenol and total flavonoid were measured based on equivalent of gallic acid and rutin, respectively. Folin-Ciocalteu's reagent (for total polyphenol content) and AlCl₃ solution (for total flavonoid content) were used and absorbance was determined at λ_{max} = 765 nm and 415 nm, respectively [33].

Inclusion and exclusion criteria

All patients who enrolled in the trial were aged between 18 and 50 years, and had confirmed MS disease according to McDonalds et al.'s criteria, by a neurologist [34]. A stable disability level of 6 or less on the Krutzke's extended disability status scale (EDSS) made the patient eligible for enrolment in the trial [35]. Other inclusion criteria included: no disease attack during the previous month, no history of other autoimmune disease, the presence of fatigue symptoms quantified by means of Fatigue Severity Scale (FSS) and the presence of sleep disorders according to Insomnia Severity Index (ISI). Patients had to have regular contact with a responsible caregiver. They were excluded from the trial if they had evidence of dementia or psychosis, cardiovascular disease, diabetes, severe depression, clinically significant major infections or pregnancy and breastfeeding status. In addition, any

other herbal medications or natural antioxidants affecting fatigue and sleep disorders were not allowed during the trial. The use of other disease modifying therapies for MS was permitted. Participants were instructed to avoid changing their routine physical activity and eating habits during the trial.

Randomization, blinding and Intervention

Twenty-six patients with fatigue symptoms and 26 patients with sleep disorder were randomly allocated to either the placebo or the drug groups. A permuted block randomization using a computer-generated random allocation was used with fixed block size, using one-to-one allocation. The patients and caregivers were unaware of the treatment groups and type of medications and blinding was performed by pharmacists in the study. Each patient in both groups received 10 milliliters of the drug or placebo two times a day for 1 month.

Outcomes

Fatigue is defined as the lack of physical and mental energy or feeling of tiredness, perceived by the individual or caregiver, that interferes with usual and desired activities of daily life [7]. The symptoms of fatigue were evaluated using the following self-administered measures of it:

1) Fatigue Severity Scale (FSS); consists of 9 items with a score range of 1 to 7, with lower scores indicating less fatigue) and,

2) Modified Fatigue Impact Scale (MFIS); consists of 21 items with a score range of 0 to 84, with lower scores indicating less fatigue). FSS has been shown to have a high degree of sensitivity and consistency of changes in clinical trials, and has been found to be reliable and valid in MS [7, 36]. The Insomnia Severity Index (ISI) and Pittsburgh Sleep Quality Index (PSQI) were used to assess sleep difficulty. ISI consists of 7 questions, graded on a scale of 0 to 4, that assess the impact of insomnia on adults' quality of life. A cumulative score ≥ 15 reflects clinically significant insomnia [37]. PSQI consists of seven components that assess sleep difficulty and provide a global score of sleep on a scale of 0 to 21 (with higher scores indicating more sleep complaints) [38]. Patients completed the questionnaires at baseline and at the end of the 4th week.

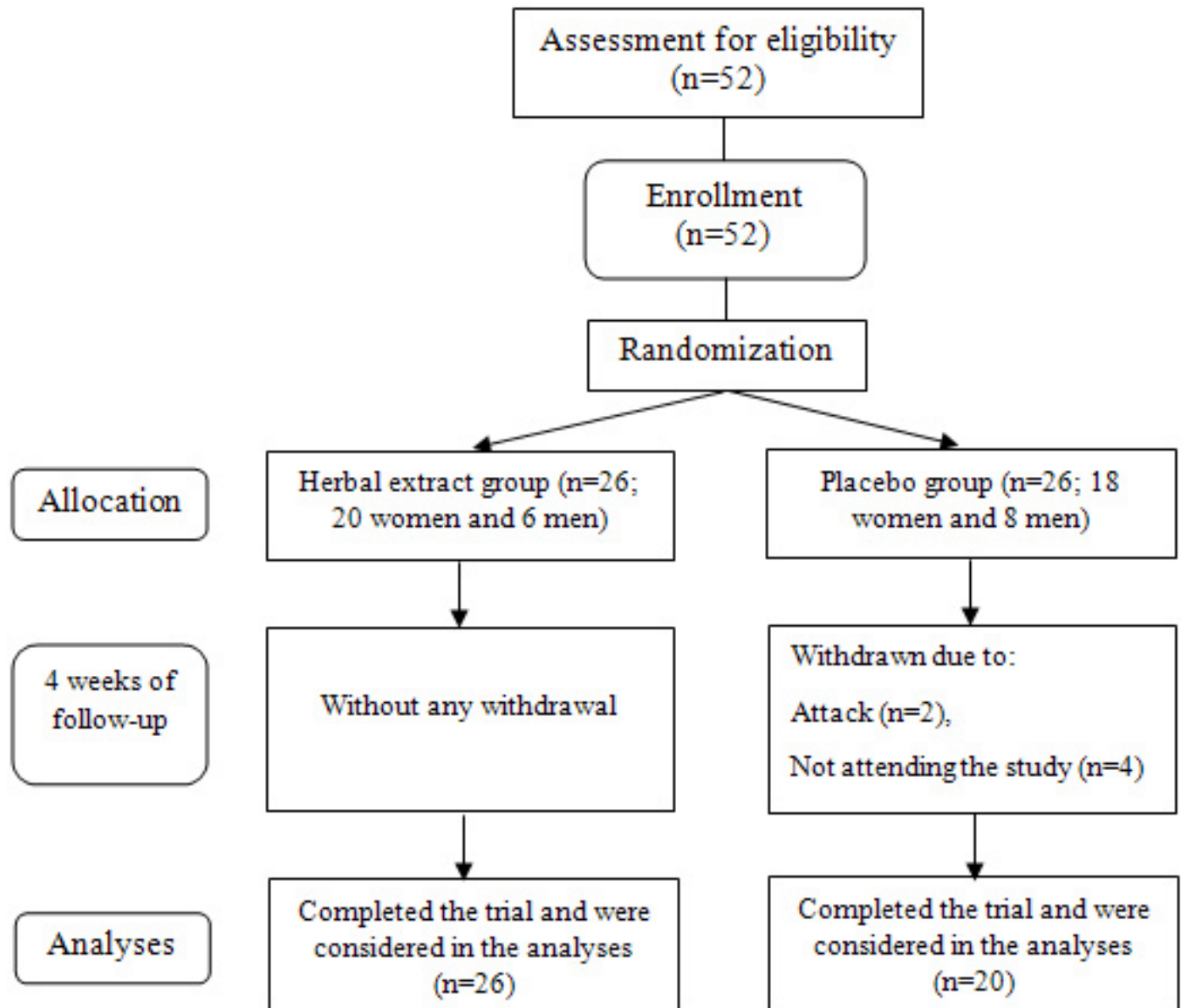
Statistical analyses

Values are expressed as mean \pm standard deviation (SD). Comparisons between groups (drug and placebo) were performed using the independent t test. Within-group differences (before and after intervention) were determined by Paired-sample t tests. Statistical comparisons were made between mean scores for the placebo and those for the herbal extract using repeated-measures analysis of variance (ANOVA). This ANOVA model included terms of time effect and interaction of time and treatment, within the main effect (herbal extract vs. placebo). $p < 0.05$ was considered to be statistically significant. Results were statistically analyzed using SPSS, version 16 (SPSS Inc., Chicago, IL, USA).

Results

The experiments showed that the compound drug contains total phenol and total flavonoid equal to 346 ± 6 mg gallic acid equivalent/100 ml and 297 ± 2 mg rutin equivalent/100 ml, respectively.

Figure 1. Flow diagram of the patients



Six patients in the herbal extract group were excluded from the trial, due to the occurrence of disease attack (n=2) and unwillingness to continue the trial (n=4). There was not any exclusion case in the placebo group. Finally, a total of 46 participants [the drug group (n=20) and the placebo group (n=26)] completed the study (Figure 1). The mean (\pm SD) of baseline age was 36.8 ± 7.4 years and 35 ± 9 years in the herbal extract and placebo group, respectively. There were no significant differences between the two groups in terms of their marital status and gender (Table 1). Also, at baseline, there were no significant differences in FSS, MFIS, ISI and PSQI scores between the herbal extract and placebo groups.

Table 1. Basic characteristics of study subjects

| Variable | Herbal extract group (n=26) | Placebo group (n=20) |
|-------------------------------|--------------------------------|-------------------------|
| Mean age (years) | 36.8 ± 7.4 | 35 ± 9 |
| Mean disease duration (years) | 7.1 ± 5.8 | 12 ± 5.6 |
| Gender [n (percent)] | | |
| Male | 6 (23.1 %)* | 4 (20%)* |
| Female | 20 (76.9 %)* | 16 (80%)* |
| Marital status [n (percent)] | | |
| Married | 22 (84.6 %)* | 4 (20%)* |
| Single | 4 (15.4 %)* | 16 (80%)* |

Values are mean ± standard deviation.

* Values are number (%).

After intervention, as shown in Table 2, there was a significant reduction in FSS and MFIS scores in both groups, but in regard to Table 3, the mean change rate in FSS (-19.8 ± 11.8 vs. -4.6 ± 5.9 , $p=0.00$) and MFIS scores (19.7 ± 12.8 vs. -3.5 ± 5.2 , $p=0.00$) in the drug group was significantly higher compared to the placebo group. ISI and PSQI scores decreased significantly after four weeks in the drug group (9.7 ± 7.5 , $p=0.00$ and 8.8 ± 7.0 , $p=0.00$) and the placebo group (2.3 ± 2.8 , $p=0.00$ and 1.2 ± 1.5 , $p=0.00$), but the change rate in ISI (-9.7 ± 7.5 vs. -2.3 ± 2.8 , $p=0.00$) and PSQI scores (-8.8 ± 7.0 vs. -1.2 ± 1.5 , $p=0.00$) in the drug group was significantly higher than the placebo group. Repeated measures of ANOVA with ISI and PSQI scores demonstrated significant reduction in both the drug and the placebo groups (Tables 2 and 3, Figure 2).

Table 2. Comparison of scores on FSS, MFIS, ISI and PSQI between herbal extract and placebo group

| | Herbal extract group (n=26) | | | Placebo group (n=20) | | |
|------------|-----------------------------|------------|-------|----------------------|------------|-------|
| | baseline | endpoint | p* | baseline | endpoint | p* |
| FSS score | 49.9 ± 9.4 | 30 ± 12.3 | 0.000 | 47.1 ± 9.9 | 42.5 ± 13 | 0.000 |
| MFIS score | 51.2 ± 17.8 | 31.4 ± 17 | 0.000 | 42.5 ± 10.5 | 39 ± 12.2 | 0.005 |
| ISI score | 18.8 ± 3.4 | 9.15 ± 7.0 | 0.000 | 19.4 ± 2.9 | 17.1 ± 4.7 | 0.005 |
| PSQI score | 15.9 ± 4.1 | 7.0 ± 6.0 | 0.000 | 16.7 ± 2.3 | 15.4 ± 3.1 | 0.000 |

Values are means ± standard deviation. *Indicates within-group differences (paired-sample t test).

Table 3. Comparison of the mean difference of variables at baseline and endpoint of study between two groups

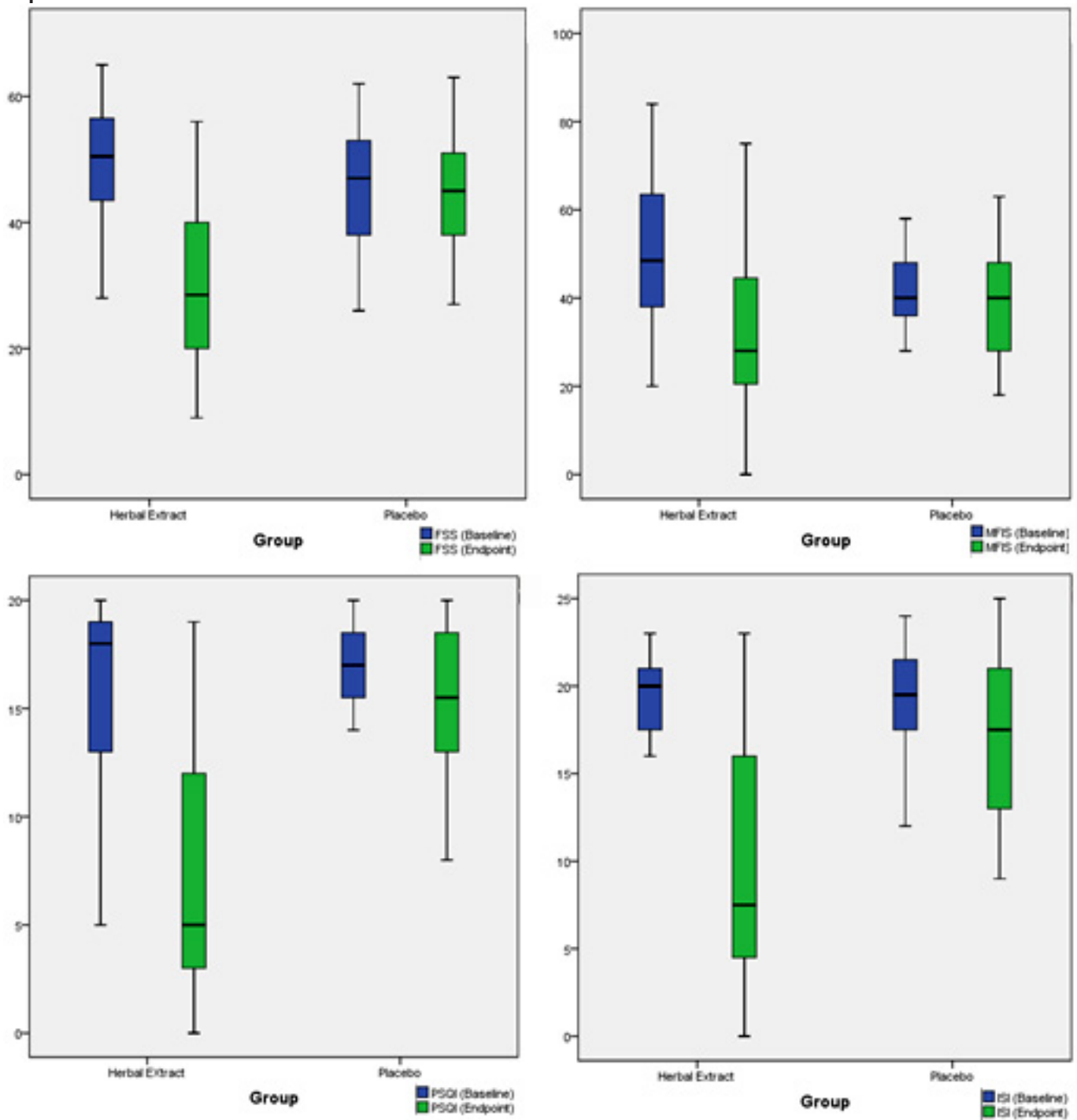
| Variable | Herbal extract | placebo | p* |
|----------|----------------|------------|-------|
| FSS | -19.8 ± 11.8 | -4.6 ± 5.9 | 0.000 |
| MFIS | -19.7 ± 12.8 | -3.5 ± 5.2 | 0.000 |
| ISI | -9.7 ± 7.5 | -2.3 ± 2.8 | 0.000 |
| MSQI | -8.8 ± 7.0 | -1.2 ± 1.5 | 0.000 |

Values are means ± standard deviation.

*Indicates between-group differences (Independent t test).

Furthermore, there were no side effects reported by the patients using drug and placebo in both groups.

Figure 2. Changes in the ISI, PSQI, FSS and MFIS scores after an 8-week period of intervention. ISI, insomnia severity scale; PSQI, Pittsburgh sleep quality index; FSS, fatigue severity scale; MFIS, modified fatigue impact scale



Discussion

The main purpose of this study was to investigate the effects of a Persian herbal remedy on fatigue and sleep disorder in patients with MS. Our study showed that this herbal extract treatment for four weeks in MS patients resulted in improved fatigue status, a significant decrease in FSS scores and MFIS scores. We found that this Persian medicine treatment reduced sleep disorder complications with decreased ISI and PSQI scores in the intervention group. All changes in fatigue and sleep disorder scores were significant, even after adjustments were made for age, marital status and disease duration. To the best of our knowledge, this study is the first of its kind to examine the anti-fatigue and hypnotic effects of a combination of several herbal extracts in MS patients.

MS is associated with several comorbid disorders, such as fatigue and sleep disorders, with detrimental impacts on overall health and quality of life in the patients [4, 8]. Due to the high prevalence of fatigue and sleep disorders in MS patients and its potential role in exacerbating other MS symptoms, the treatment of these complications are important [9, 6]. Fatigue treatment is a difficult and complex task and in most cases combined approaches are recommended [9]. Currently, there is an increasing interest in using complementary and alternative medicine (CAM) to overcome MS symptoms and improve quality of life among MS patients. Herbal medicine is among the most common CAM therapies being used by MS patients [11, 12]. In this regard, we examined the effect of a combination of several herbal extracts which have been used in Persian medicine in the treatment of fatigue and sleep disorders. Previous studies have reported the effects of every single one of these herbal extracts on fatigue and sleep disorders in other clinical conditions, but the combined effects of these extracts in MS patients have not been assessed. In our study, a combination of these herbal extracts significantly reduced fatigue and sleep disorders in MS patients. These anti-fatigue and hypnotic effects could be attributed to bioactive components in each of these herbal extracts and to their synergistic effects.

There are several modifiable factors that contribute to sleep problems in MS patients, including fatigue, depression, leg cramps, pain and nocturia. Among these, depression has the highest association with sleep disorders in MS patients [6]. Sleep disorders are associated with increased levels of systemic inflammation [39]. Experimental sleep deprivation studies have reported increased levels of circulating proinflammatory cytokines such as interleukin (IL)-6 and tumor necrosis factor (TNF)- α [40]. Elevated levels of IL-6 and TNF- α were also observed in MS patients [8]. The results from animal studies have demonstrated that proinflammatory cytokines signal the CNS to initiate a series of behavioral changes such as fatigue, sleep disturbances and depressive-like symptoms [41]. Depression has a strong relationship with fatigue and a reduction in fatigue severity was observed after the treatment of depression [42].

C. sativus (saffron) has traditionally been used throughout the world for its therapeutic effects. These include anticonvulsant, antispasmodic, anxiolytic, hypnotic, sedative and relaxant effects [15, 14]. Safranal is one of the bioactive compounds found in saffron which has been shown to increase sleeping time, dose dependently [14]. In recent years, the potential neuroprotective role of crocin, the other bioactive compound in saffron, in chronic neuroinflammatory diseases such as AD, PD and MS, has been the subject of some research [15]. In a study by Ghazavi et al., the effects of ethanol extract of saffron in the treatment of EAE mice were evaluated. They noted that saffron significantly reduced the clinical symptoms in EAE mice, inhibited leukocyte infiltration to CNS and increased total antioxidant capacity production [43]. The anti-inflammatory effects of saffron and its bioactive components have been studied in different models of inflammation. Saffron may enhance antioxidant enzymes involved in the scavenging of reactive oxygen species (ROS) which are key mediators of oxidative stress and inflammatory response [44]. A study by Tamaddonfar et al. showed that anti-inflammatory and antinociceptive effects of crocin and safranal may also be mediated by the inhibition of cyclooxygenase [45]. St John's wort (*H. perforatum*) is another herbal extract in our study that has been used to treat insomnia and depression in traditional medicine [46]. Sharpley et al. studied the effect of two doses (0.9 and 1.8 mg) of St John's wort on the sleep polysomnogram of 12 healthy elderly volunteers using a cross-over placebo-controlled design. The results showed that both doses of St John's wort significantly induced an increase in deep sleep and the latency to rapid eye movement (REM) sleep [47]. The mechanisms by which conventional antidepressant drugs increase REM sleep are attributed to their ability to potentiate serotonin and noradrenaline neurotransmission. St John's wort's ability to modify some aspects of serotonin and noradrenaline function have been shown in animal studies [47]. Chronic treatment with St John's wort may also upregulate post-synaptic serotonin and serotonin receptors [46]. Further studies are needed to investigate the exact mechanisms of action of St John's wort in modulation of sleep.

Cinnamon and its active metabolite in the liver, sodium benzoate, have shown neuroprotective properties in different neurodegenerative diseases including AD, PD and MS. It has been proposed that cinnamon and sodium benzoate administration in EAE may reduce inflammation in the CNS, preserve the integrity of blood brain barrier (BBB), restore myelin level and protect myelin-specific genes, improve locomotor activities and inhibit clinical symptoms [22]. Cinnamon extract treatment has been found to decrease the mRNA expression of inflammatory cytokines including IL-6, IL-1 β and TNF- α and its oral administration inhibits the progression of inflammation [48]. In a study by Shokri Mashhadi et al., oral daily administration of 3 grams of cinnamon in Persian female martial athletes for 6 weeks significantly reduced muscle soreness compared to controls, with plasma levels of IL-6 significantly reduced in the cinnamon group, but the reduction was not significant compared to controls. They

noted that the dose of cinnamon was not big enough for the assessment time and number of participants in the study [48]. Also, the antioxidant effects of cinnamon in healthy subjects, through increasing total antioxidant capacity and decreasing lipid peroxidation, have been reported [49].

The syrup of *V.vinifera* is another compound in our herbal extract which has neuroprotective properties [23]. Its seeds and skin contain several bioactive components such as proanthocyanidins, anthocyanidins and resveratrol [23, 32]. About 70 % to 95 % of standardized proanthocyanidins found in grape seed extract and fresh grape skins contains about 50 to 100 µg/g wet weight resveratrol [32, 23]. Antioxidant, anti-inflammatory, chemopreventive, anti-cancer, anti-microbial, anti-diabetic and anti-asthmatic activities of these components have been reported in animal and human studies [23, 32]. Emerging evidence suggests that these bioactive components may also have anti-fatigue activities. A double-blind, placebo-controlled crossover study performed by Edwards et al. evaluated 40, 80 and 120 mg of anthocyanidins in patients with primary fibromyalgia for 3 months. There was a significant improvement in sleep, fatigue and general health compared to the placebo group at a dose of 80 mg [26]. In a study by Xie et al. proanthocyanidin administration to male mice for 30 days with four different doses (0, 1.7, 16.7 and 50 mg/kg body weight) resulted in a significant decrease in lactic acid concentration, an increase in hemoglobin content and hepatic glycogen content and longer performance in loaded-swimming time test compared to the control group. The author suggests that proanthocyanidin has an anti-fatigue effect [27]. Several mechanisms are involved in anti-fatigue effects of the grape seed extract 'proanthocyanidins' which include: 1) increasing liver and muscle glycogen reserves, 2) maintaining blood glucose at stable levels, 3) improving the activity of antioxidant enzymes such as superoxide dismutase (SOD) and glutathione peroxidase (GPx) in the liver, 4) reducing malondialdehyde (MDA) content and, 5) promoting fat utilization [25]. Wu et al. found that 3 weeks of orally administered resveratrol at three doses (25, 50 and 125 mg/kg/day) in male mice increased glucose levels and decreased serum lactate, ammonia levels and creatine kinase activity. The intervention group with a dose of 25 mg has significantly longer exhaustive swimming time than that of the control group. They concluded that resveratrol administration could be a potential agent with anti-fatigue effects [32].

Despite extensive use of herbal plants in traditional medicine for fatigue and sleep disorders, little research has been conducted in this regard. Since sleep disorders and fatigue are associated with enhanced inflammatory cytokine production, especially TNF- α and IL-6 [40, 50], the beneficial effects of our herbal extract in this study may be mediated, to some extent, through their action on reducing inflammatory cytokines. The anti-fatigue and hypnotic effects of our herbal extract observed in this study can be attributed, at least in part, to its rich content of bioactive compounds from each herbal plant in the mixture, working synergistically. Due to the complexity and diversity of bioactive compounds in this herbal extract, characterization

and isolation of every compound and assessment of their activities is rather difficult. Further studies are needed to characterize different compounds of each of these herbs. In addition, the small number of patients and the short period of follow-up are other limitations of our study.

Conclusion

Eventually, it can be concluded that the mixture of herbal extracts used in this study including *C.sativus*, *H.perforatum*, *C.verum*, and *V.vinifera*, can be taken into account as a safe and effective anti-fatigue and hypnotic agent as complementary and supportive care for fatigue and sleep disorders in MS patients.

Abbreviations:

AD: Alzheimer's disease; ANOVA: Analysis of variance; BBB: Blood brain barrier; CAM Complementary and alternative medicine; CNS: Central nervous system; EAE: Experimental allergic autoimmune; EDSS: Extended disability status scale; FSS: Fatigue severity scale; GPx: Glutathione peroxidase; GSPE: Grape seed proanthocyanidin extract; IL: Interleukin; ISI: Insomnia severity scale; MDA: Malondialdehyde; MFIS: Modified fatigue impact scale; MS: Multiple sclerosis; PD: Parkinson's disease; PSQI: Pittsburgh sleep quality index; RCT: Randomized clinical trial; REM: Rapid eye movement; ROS: Reactive oxygen species; SD: Standard deviation; SOD: Superoxide dismutase; TNF: Tumor necrosis factor.

References

1. Compston A, Coles A. Multiple sclerosis. *The Lancet*.372(9648):1502-17. doi:10.1016/S0140-6736(08)61620-7.
2. Sanoobar M, Dehghan P, Khalili M, Azimi A, Seifar F. Coenzyme Q10 as a treatment for fatigue and depression in multiple sclerosis patients: a double blind randomized clinical trial. *Nutritional neuroscience*. 2016;19(3):138-43.
3. Khalili M, Eghtesadi S, Mirshafiey A, Eskandari G, Sanoobar M, Sahraian MA et al. Effect of lipoic acid consumption on oxidative stress among multiple sclerosis patients: a randomized controlled clinical trial. *Nutritional neuroscience*. 2014;17(1):16-20.
4. Marrie RA, Reider N, Cohen J, Trojano M, Sorensen PS, Cutter G et al. A systematic review of the incidence and prevalence of sleep disorders and seizure disorders in multiple sclerosis. *Multiple Sclerosis Journal*. 2015;21(3):342-9.
5. Attarian HP, Brown KM, Duntley SP, Carter JD, Cross AH. The relationship of sleep disturbances and fatigue in multiple sclerosis. *Archives of neurology*. 2004;61(4):525-8.
6. Bamer AM, Johnson KL, Amtmann DA, Kraft GH. Beyond fatigue: Assessing variables associated with sleep problems and use of sleep medications in multiple sclerosis. *Clinical epidemiology*. 2010;2:99.
7. Krupp LB, Christodoulou C. Fatigue in multiple sclerosis. *Current neurology and neuroscience reports*. 2001;1(3):294-8.

8. Brass SD, Li C-S, Auerbach S. The underdiagnosis of sleep disorders in patients with multiple sclerosis. *Journal of clinical sleep medicine: JCSM: official publication of the American Academy of Sleep Medicine.* 2014;10(9):1025.
9. Comi G, Leocani L, Rossi P, Colombo B. Physiopathology and treatment of fatigue in multiple sclerosis. *Journal of neurology.* 2001;248(3):174-9.
10. Rammohan K, Rosenberg J, Lynn D, Blumenfeld A, Pollak C, Nagaraja H. Efficacy and safety of modafinil (Provigil®) for the treatment of fatigue in multiple sclerosis: a two centre phase 2 study. *J Neurol Neurosurg Psychiatry.* 2002;72(2):179-83.
11. Ahmadi A, Habibi G, Farrokhnia M. MS14, an Iranian herbal-marine compound for the treatment of multiple sclerosis. *Chinese journal of integrative medicine.* 2010;16(3):270-1.
12. Namjooyan F, Ghanavati R, Majdinasab N, Jokari S, Janbozorgi M. Uses of complementary and alternative medicine in multiple sclerosis. *Journal of traditional and complementary medicine.* 2014;4(3):145-52.
13. Akhondzadeh S. Herbal medicines in the treatment of psychiatric and neurological disorders. *Low-Cost Approaches to Promote Physical and Mental Health.* 2007:119-38.
14. Andalib S, Naeini AM, Vaseghi A, Vaseghi G. Sedative and hypnotic effects of Iranian traditional medicinal herbs used for treatment of insomnia. 2011.
15. Poma A, Fontecchio G, Carlucci G, Chichiricco G. Anti-inflammatory properties of drugs from saffron crocus. *Anti-Inflammatory & Anti-Allergy Agents in Medicinal Chemistry (Formerly Current Medicinal Chemistry-Anti-Inflammatory and Anti-Allergy Agents).* 2012;11(1):37-51.
16. Hosseinzadeh H, Noraei NB. Anxiolytic and hypnotic effect of *Crocus sativus* aqueous extract and its constituents, crocin and safranal, in mice. *Phytotherapy Research.* 2009;23(6):768-74.
17. Nosratabadi R, Rastin M, Sankian M, Haghmorad D, Tabasi N, Zamani S et al. St. John's wort and its component hyperforin alleviate experimental autoimmune encephalomyelitis through expansion of regulatory T-cells. *Journal of immunotoxicology.* 2016;13(3):364-74.
18. Cabrelle A, Dell'Aica I, Melchiori L, Carraro S, Brunetta E, Niero R et al. Hyperforin down-regulates effector function of activated T lymphocytes and shows efficacy against Th1-triggered CNS inflammatory-demyelinating disease. *Journal of leukocyte biology.* 2008;83(1):212-9.
19. Lin Y, Zhang J-C, Fu J, Chen F, Wang J, Wu Z-L et al. Hyperforin attenuates brain damage induced by transient middle cerebral artery occlusion (MCAO) in rats via inhibition of TRPC6 channels degradation. *Journal of Cerebral Blood Flow & Metabolism.* 2013;33(2):253-62.
20. Brahmachari S, Jana A, Pahan K. Sodium benzoate, a metabolite of cinnamon and a food additive, reduces microglial and astroglial inflammatory responses. *The Journal of Immunology.* 2009;183(9):5917-27.
21. Pahan K. Immunomodulation of experimental allergic encephalomyelitis by cinnamon metabolite sodium benzoate. *Immunopharmacology and immunotoxicology.* 2011;33(4):586-93.
22. Pahan K. Prospects of cinnamon in multiple sclerosis. *Journal of multiple sclerosis.* 2015;2(3):1000149.
23. Waggas AM. Grape seed extract (*Vitisvinifera*) alleviate neurotoxicity and hepatotoxicity induced by lead acetate in male albino rats. *Journal of Behavioral and Brain Science.* 2012;2(02):176.
24. Sato F, Martinez NE, Shahid M, Rose JW, Carlson NG, Tsunoda I. Resveratrol exacerbates both autoimmune and viral models of multiple sclerosis. *The American journal of pathology.* 2013;183(5):1390-6.
25. Shan Y, Ye X-h, Xin H. Effect of the grape seed proanthocyanidin extract on the free radical and energy metabolism indicators during movement. *Scientific Research and Essays.* 2010;5(2):148-53.
26. Edwards A, Blackburn L, Christie S, Townsend S, David J. Food supplements in the treatment of primary fibromyalgia: a double-blind, crossover trial of anthocyanidins and placebo. *Journal of nutritional & environmental medicine.* 2000;10(3):189-99.
27. LIU Xie, LI Xiaoning, BAO Liuxing et al. The Antifatigue Effect of Grape Seed Extract-proanthocyanidin [J]. *Practical Preventive Medicine.* 2004;1:015.
28. Fonseca-Kelly Z, Nassrallah M, Uribe J, Khan RS, Dine K, Dutt M et al. Resveratrol neuroprotection in a chronic mouse model of multiple sclerosis. *Frontiers in neurology.* 2012;3.
29. Singh NP, Hegde VL, Hofseth LJ, Nagarkatti M, Nagarkatti P. Resveratrol (trans-3, 5, 4'-trihydroxystilbene) ameliorates experimental allergic encephalomyelitis, primarily via induction of apoptosis in T cells involving activation of aryl hydrocarbon receptor and estrogen receptor. *Molecular pharmacology.* 2007;72(6):1508-21.
30. Wang D, Li S-P, Fu J-S, Zhang S, Bai L, Guo L. Resveratrol defends blood-brain barrier integrity in experimental autoimmune encephalomyelitis mice. *Journal of neurophysiology.* 2016;116(5):2173-9.
31. Ghaiad HR, Nooh MM, El-Sawalhi MM, Shaheen AA. Resveratrol promotes remyelination in cuprizone model of multiple sclerosis: biochemical and histological study. *Molecular neurobiology.* 2017;54(5):3219-29.
32. Wu R-E, Huang W-C, Liao C-C, Chang Y-K, Kan N-W, Huang C-C. Resveratrol protects against physical fatigue and improves exercise performance in mice. *Molecules.* 2013;18(4):4689-702.
33. Hajihaydari MR, Yarmohammadi ME, Izadi P, Jafari F, Emadi F, Emaratkar E et al. Effect of *Nepeta bracteata* Benth. on allergic rhinitis symptoms: A randomized double-blind clinical trial. *Journal of research in medical sciences: the official journal of Isfahan University of Medical Sciences.* 2017;22.
34. McDonald WI, Compston A, Edan G, Goodkin D, Hartung HP, Lublin FD et al. Recommended diagnostic criteria for multiple sclerosis: guidelines from the International Panel on the diagnosis of multiple sclerosis. *Annals of neurology.* 2001;50(1):121-7.
35. Kurtzke JF. Rating neurologic impairment in multiple sclerosis an expanded disability status scale (EDSS). *Neurology.* 1983;33(11):1444-.
36. Holtzer R, Foley F. The relationship between subjective reports of fatigue and executive control in multiple sclerosis. *Journal of the neurological sciences.* 2009;281(1):46-50.

37. Bastien CH, Vallières A, Morin CM. Validation of the Insomnia Severity Index as an outcome measure for insomnia research. *Sleep medicine*. 2001;2(4):297-307.
38. Moghaddam JF, Nakhaee N, Sheibani V, Garrusi B, Amirkafi A. Reliability and validity of the Persian version of the Pittsburgh Sleep Quality Index (PSQI-P). *Sleep and Breathing*. 2012;16(1):79-82.
39. Prather AA, Vogelzangs N, Penninx BW. Sleep duration, insomnia, and markers of systemic inflammation: results from the Netherlands Study of Depression and Anxiety (NESDA). *Journal of psychiatric research*. 2015;60:95-102.
40. Irwin MR, Wang M, Campomayor CO, Collado-Hidalgo A, Cole S. Sleep deprivation and activation of morning levels of cellular and genomic markers of inflammation. *Archives of internal medicine*. 2006;166(16):1756-62.
41. Bower JE, Ganz PA, Irwin MR, Kwan L, Breen EC, Cole SW. Inflammation and behavioral symptoms after breast cancer treatment: do fatigue, depression, and sleep disturbance share a common underlying mechanism? *Journal of clinical oncology*. 2011;29(26):3517-22.
42. Kos D, Kerckhofs E, Nagels G, D'hooghe M, Ilsbrouckx S. Origin of fatigue in multiple sclerosis: review of the literature. *Neurorehabilitation and Neural Repair*. 2008;22(1):91-100.
43. Ghazavi A, Mosayebi G, Salehi H, Abtahi H. Effect of ethanol extract of saffron (*Crocus sativus* L.) on the inhibition of experimental autoimmune encephalomyelitis in C57bl/6 mice. *Pakistan journal of biological sciences: PJBS*. 2009;12(9):690-5.
44. Javadi B, Sahebkar A, Emami SA. A survey on saffron in major Islamic traditional medicine books. *Iranian journal of basic medical sciences*. 2013;16(1):1.
45. Tamaddonfard E, Farshid A-A, Eghdami K, Samadi F, Erfanparast A. Comparison of the effects of crocin, safranal and diclofenac on local inflammation and inflammatory pain responses induced by carrageenan in rats. *Pharmacological Reports*. 2013;65(5):1272-80.
46. Kim C-S, Han J-Y, Kim S-H, Hong JT, Oh K-W. Herbs for the treatment of insomnia. *Biomol Ther*. 2011;19:274-81.
47. Sharpley A, McGavin C, Whale R, Cowen P. Antidepressant-like effect of *Hypericum perforatum* (St John's wort) on the sleep polysomnogram. *Psychopharmacology*. 1998;139(3):286-7.
48. Mashhadi NS, Ghiasvand R, Askari G, Feizi A, Hariri M, Darvishi L et al. Influence of ginger and cinnamon intake on inflammation and muscle soreness induced by exercise in Iranian female athletes. *International journal of preventive medicine*. 2013;4(Suppl 1):S11.
49. Azimi P, Ghiasvand R, Feizi A, Hariri M, Abbasi B. Effects of cinnamon, cardamom, saffron, and ginger consumption on markers of glycemic control, lipid profile, oxidative stress, and inflammation in type 2 diabetes patients. *The review of diabetic studies: RDS*. 2014;11(3):258.
50. Heesen C, Nawrath L, Reich C, Bauer N, Schulz K, Gold S. Fatigue in multiple sclerosis: an example of cytokine mediated sickness behaviour? *Journal of Neurology, Neurosurgery & Psychiatry*. 2006;77(1):34-9.

What a low prevalence of rheumatoid arthritis in sickle cell diseases

Mehmet Rami Helvaci (1)

Abdulrazak Abyad (2)

Lesley Pocock (3)

(1) Specialist of Internal Medicine, MD

(2) Middle-East Academy for Medicine of Aging, MD

(3) medi+WORLD International

Correspondence:

Prof Dr Mehmet Rami Helvaci,

07400, ALANYA, Turkey

Phone: 00-90-506-4708759

Email: mramihelvaci@hotmail.com

Received: April 19, 2018; Accepted: July 1, 2018; Published: August 1, 2018

Citation: Helvaci MR, Abyad A, Pocock L. What a low prevalence of rheumatoid arthritis in sickle cell diseases. World Family Medicine. 2018; 16(8): 32-37. DOI: 10.5742MEWFM.2018.93485

Abstract

Background: We tried to understand whether or not there is a lower prevalence of rheumatoid arthritis (RA) due to moderate to severe immunosuppression in sickle cell diseases (SCDs).

Methods: All patients with the SCDs and age and sex-matched controls were studied.

Results: The study included 428 patients with the SCDs (220 males) and 433 controls (223 males). Mean ages of the SCDs patients were similar in males and females (30.6 versus 30.1 years, respectively, $p>0.05$). Both smoking (24.0% versus 6.2%) and alcohol (5.0% versus 0.4%) were significantly higher in males with the SCDs ($p<0.001$ for both). Although RA was diagnosed in 2.7% of the control cases (six females and six males), this ratio was only 0.2% (just one female) in the SCDs patients ($p<0.01$). On the other hand, transfused red blood cell units in their lives (47.6 versus 28.4, $p=0.000$), chronic obstructive pulmonary disease (25.4% versus 7.2%, $p<0.001$), ileus (7.2% versus 1.4%, $p<0.001$), cirrhosis (7.2% versus 1.9%, $p<0.001$), leg ulcers (20.0% versus 7.2%, $p<0.001$), digital clubbing (14.0% versus 6.2%, $p<0.001$), coronary artery disease (18.1% versus 12.9%, $p<0.05$), chronic renal disease (10.4% versus 6.2%, $p<0.05$), and stroke (12.2% versus 7.6%, $p<0.05$) were all higher in males with the SCDs.

Conclusion: SCDs are severe and continuous inflammatory processes on vascular endothelium, particularly at the capillary level, and terminate with end-organ failures in early years of life. Beside that, SCDs may cause moderate to severe immunosuppression by several mechanisms that may be the cause of significantly lower prevalence of RA in the SCDs.

Key words: Rheumatoid arthritis, sickle cell diseases, chronic endothelial damage, immunosuppression

Introduction

Chronic endothelial damage may be the major cause of aging and associated morbidity and mortalities by causing disseminated tissue hypoxia all over the body. Much higher blood pressure (BP) of the afferent vasculature may be the major underlying cause, and probably whole afferent vasculature including capillaries are involved in the process. Some of the well-known accelerators of the inflammatory process are physical inactivity, excess weight, smoking, and alcohol for the development of irreversible consequences including obesity, hypertension (HT), diabetes mellitus (DM), cirrhosis, peripheral artery disease (PAD), chronic obstructive pulmonary disease (COPD), chronic renal disease (CRD), coronary artery disease (CAD), mesenteric ischemia, osteoporosis, and stroke, all of which terminate with premature aging and death. They were researched under the title of metabolic syndrome in the literature (1, 2). Similarly, sickle cell diseases (SCDs) are severe and continuous inflammatory processes on vascular endothelium, particularly at the capillary level, and terminate with end-organ failures in early years of life. Hemoglobin S (HbS) causes loss of elastic and biconcave disc shaped structures of red blood cells (RBCs). Probably loss of elasticity instead of shape is the main problem since sickling is rare in peripheral blood samples of the SCDs cases with associated thalassemia minors, and human survival is not so affected in hereditary spherocytosis or elliptocytosis. Loss of elasticity is present during whole lifespan, but exaggerated with increased metabolic rate of the body. The hard RBCs induced severe and continuous vascular endothelial inflammation, edema, and fibrosis terminate with tissue hypoxia all over the body (3, 4). Capillary systems may mainly be involved in the process due to their distribution function for the hard bodies. We tried to understand whether or not there is a lower prevalence of rheumatoid arthritis (RA) because of moderate to severe immunosuppression in the SCDs.

Material and Methods

The study was performed in the Medical Faculty of the Mustafa Kemal University between March 2007 and April 2016. All patients with the SCDs and age and sex-matched controls were studied. The SCDs were diagnosed with the hemoglobin electrophoresis performed via high performance liquid chromatography (HPLC). Medical histories of SCDs patients including smoking habit, regular alcohol consumption, painful crises per year, transfused units of RBCs in their lives, surgical operations, leg ulcers, and stroke were learnt. Due to their cumulative atherosclerotic effects together with the SCDs, patients with a history of one pack-year were accepted as smokers, and one drink-year were accepted as drinkers. A complete physical examination was performed by the same Internist. Cases with acute painful crisis or another inflammatory event were treated at first, and the laboratory tests and clinical measurements were performed on the silent phase. A check up procedure including serum iron, iron binding capacity, ferritin, creatinine, hepatic function

tests, markers of hepatitis viruses A, B, C and human immunodeficiency virus, a posterior-anterior chest x-ray film, an electrocardiogram, a Doppler echocardiogram both to evaluate cardiac walls and valves and to measure systolic BP of pulmonary artery, an abdominal ultrasonography, a venous Doppler ultrasonography of the lower limbs, a computed tomography of brain, and a magnetic resonance imaging (MRI) of hips was performed. Other bones for avascular necrosis were scanned according to the patients' complaints. Associated thalassemia minors were detected with serum iron, iron binding capacity, ferritin, and hemoglobin electrophoresis performed via HPLC. Patients with RA were classified with the criteria of early rheumatoid arthritis (ERA) (5). The ERA criteria include a morning stiffness of 30 minutes or longer, arthritis of three or more joint areas, arthritis of hand joints, positivity of rheumatoid factor (RF), and positivity of anti-cyclic citrullinated peptide (anti-CCP) antibody. RA is defined by the presence of three or more of the criteria. In differential diagnosis, systemic lupus erythematosus (SLE) is classified with the American College of Rheumatology criteria of 1997 (6). The criterion for diagnosis of COPD is post-bronchodilator forced expiratory volume in one second/forced vital capacity of less than 70% (7). An x-ray film of abdomen in upright position was taken just in patients with abdominal distention or discomfort, vomiting, obstipation, or lack of bowel movement, and ileus was diagnosed with gaseous distention of isolated segments of bowel, vomiting, obstipation, cramps, and with the absence of peristaltic activity on the abdomen. Systolic BP of the pulmonary artery of 40 mmHg or higher is accepted as pulmonary hypertension (8). CRD is diagnosed with a persistent serum creatinine level of 1.3 mg/dL in males and 1.2 mg/dL in females. Cirrhosis is diagnosed with physical examination, liver function tests, ultrasonographic evaluation, and tissue samples in case of indication. Digital clubbing is diagnosed with the ratio of distal phalangeal diameter to interphalangeal diameter which is greater than 1.0, and with the presence of Schamroth's sign (9, 10). An exercise electrocardiogram is performed just in cases with an abnormal electrocardiogram and/or angina pectoris. Coronary angiography is taken just for the exercise electrocardiogram positive cases. So CAD was diagnosed either angiographically or with the Doppler echocardiographic findings as the movement disorders in the cardiac walls. Rheumatic heart disease is diagnosed with the echocardiographic findings, too. Avascular necrosis of bones is diagnosed by means of MRI (11). Stroke is diagnosed by the computed tomography of brain. Sickle cell retinopathy is diagnosed with ophthalmologic examination in patients with visual complaints. Eventually, prevalence of RA were detected both in the SCDs and control groups. Mann-Whitney U test, Independent-Samples t test, and comparison of proportions were used as the methods of statistical analyses.

Results

The study included 428 patients with the SCDs (220 males and 208 females) and 433 age and sex-matched control cases (223 males and 210 females), totally. Mean ages of the SCDs patients were similar in males and females (30.6 versus 30.1 years, respectively, $p>0.05$). Mean ages of the control cases were 30.4 versus 30.3 years in males and females, respectively ($p>0.05$ for both). Prevalences of associated thalassemia minors were similar in males and females with the SCDs (72.2% versus 67.7%, respectively, $p>0.05$). Both smoking (24.0% versus 6.2%) and alcohol consumption (5.0% versus 0.4%) were significantly higher in males with the SCDs ($p<0.001$ for both) (Table 1). Although RA was diagnosed in 2.7% of the control cases (six females and six males), this ratio was only 0.2% (just in one female with 44 years of age) in the SCDs group ($p<0.01$) (Table 2). The mean age of RA was 44.5 ± 7.6 (30-57) years in the control group. On the other

hand, transfused RBCs in their lives (47.6 versus 28.4 units, $p=0.000$), COPD (25.4% versus 7.2%, $p<0.001$), ileus (7.2% versus 1.4%, $p<0.001$), cirrhosis (7.2% versus 1.9%, $p<0.001$), leg ulcers (20.0% versus 7.2%, $p<0.001$), digital clubbing (14.0% versus 6.2%, $p<0.001$), CAD (18.1% versus 12.9%, $p<0.05$), CRD (10.4% versus 6.2%, $p<0.05$), and stroke (12.2% versus 7.6%, $p<0.05$) were all higher in males with the SCDs, significantly. There were two cases with sickle cell retinopathy in males and one in females ($p>0.05$). There were 30 mortality cases (16 males) during the ten-year follow-up period. The mean ages of mortality were 30.8 ± 8.3 years (range 19-50) in males and 33.3 ± 9.2 years (range 19-47) in females ($p>0.05$) (Table 3). Beside these, there were four patients with HBsAg positivity (0.9%) but HBV DNA was positive in none of them by polymerase chain reaction (PCR) method. Although antiHCV was positive in 5.8% (25) of the study cases, HCV RNA was detected as positive just in three (0.7%) by PCR.

Table 1: Characteristic features of the sickle cell patients

| Variables | Male patients with SCDs* | p-value | Female patients with SCDs |
|--------------------|--------------------------|------------------|---------------------------|
| Prevalence | 51.4% (220) | Ns† | 48.5% (208) |
| Mean age (year) | 30.6 ± 10.1 (5-58) | Ns | 30.1 ± 9.9 (8-59) |
| Thalassemia minors | 72.2% (159) | Ns | 67.7% (141) |
| Smoking | 24.0% (53) | <0.001 | 6.2% (13) |
| Alcoholism | 5.0% (11) | <0.001 | 0.4% (1) |

*Sickle cell diseases †Nonsignificant ($p>0.05$)

Table 2: Comparison of the patients and control groups

| Variables | Patients with SCDs* | p-value | Control cases |
|--------------------------|------------------------|-----------------|------------------------|
| Number | 428 | Ns† | 433 |
| Female ratio | 48.5% (208) | Ns | 48.4% (210) |
| Mean age of males | 30.6 ± 10.1 (5-58) | Ns | 30.4 ± 11.1 (9-59) |
| Mean age of females | 30.1 ± 9.9 (8-59) | Ns | 30.3 ± 10.4 (9-58) |
| Prevalence of RA‡ | 0.2% (1) | <0.01 | 2.7% (12) |

*Sickle cell diseases †Nonsignificant ($p>0.05$) ‡Rheumatoid arthritis

Table 3: Associated pathologies of the sickle cell patients

| Variables | Male patients with SCDs* | p-value | Female patients with SCDs |
|----------------------------------|----------------------------|------------------|----------------------------|
| Painful crises per year | 5.0 ± 7.1 (0-36) | Ns† | 4.9 ± 8.6 (0-52) |
| Transfused units of RBCs‡ | 47.6 ± 61.6 (0-434) | 0.000 | 28.4 ± 35.8 (0-206) |
| COPD§ | 25.4% (56) | <0.001 | 7.2% (15) |
| Ileus | 7.2% (16) | <0.001 | 1.4% (3) |
| Cirrhosis | 7.2% (16) | <0.001 | 1.9% (4) |
| Leg ulcers | 20.0% (44) | <0.001 | 7.2% (15) |
| Digital clubbing | 14.0% (31) | <0.001 | 6.2% (13) |
| CAD¶ | 18.1% (40) | <0.05 | 12.9% (27) |
| CRD** | 10.4% (23) | <0.05 | 6.2% (13) |
| Stroke | 12.2% (27) | <0.05 | 7.6% (16) |
| Pulmonary hypertension | 12.7% (28) | Ns | 12.5% (26) |

*Sickle cell diseases †Nonsignificant ($p>0.05$) ‡Red blood cells §Chronic obstructive pulmonary diseases ¶Coronary artery disease **Chronic renal disease

Discussion

Chronic endothelial damage may be the leading cause of premature aging and related morbidity and mortalities in human beings. Physical inactivity, excess weight, smoking, alcohol consumption, chronic inflammatory and infectious processes, and cancers may accelerate the process. Probably, it is the most common type of vasculitis all over the world. Probably whole afferent vasculature including capillaries are mainly involved in the process. Much higher BP of the afferent vasculature may be the major underlying cause by inducing recurrent injuries on endothelium. Thus the term of venosclerosis is not as famous as atherosclerosis in the literature. Secondary to the continuous endothelial inflammation, edema, and fibrosis, vascular walls become thickened, their lumens are narrowed, and they lose their elastic nature which reduces blood flow and increases systolic BP further. Although early withdrawal of the causative factors may retard the final consequences, after development of cirrhosis, COPD, CRD, CAD, PAD, or stroke, endothelial changes cannot be reversed completely due to their fibrotic nature (12).

SCDs are life-threatening hereditary disorders affecting around 100,000 individuals in the United States (13). As a difference from other causes of chronic endothelial damage, the SCDs may keep vascular endothelium particularly at the capillary level (14), because the capillary system is the main distributor of the hard RBCs into the tissues. The hard cells induced severe and continuous endothelial damage, inflammation, edema, and fibrosis terminate with end-organ failure in early years of ages. As a result, mean lifespans of the patients were 48 years in females and 42 years in males in the literature (15), whereas they were 33.3 and 30.8 years in the present study, respectively. The great differences may be secondary to delayed diagnosis, delayed initiation of hydroxyurea therapy, and inadequate RBCs support during medical and surgical emergencies in Hatay region. Actually, RBCs support must be given during all medical and surgical events in which there is evidence of clinical deterioration in the SCDs (16, 17). RBCs supports decrease sickle cell concentration in the circulation and suppress bone marrow for the production of abnormal RBCs. So it decreases sickling induced endothelial damage all over the body during such events. According to our ten-year experiences, simple RBCs transfusions are superior to exchange. First of all, preparation of one or two units of RBCs suspensions each time rather than preparation of six units or higher provides time for clinicians to prepare more units by preventing sudden death of such patients. Secondly, transfusion of one or two units of RBCs suspensions each time decreases the severity of pain and relaxes anxiety of the patients and surroundings in a short period of time. Thirdly, transfusion of lesser units of RBCs suspensions each time decreases transfusion-related complications. Fourthly, transfusion of RBCs suspensions in the secondary health centers prevents some deaths developed during transport to the tertiary centers for the exchange. On the other hand, longer survival of females in the SCDs (15) and longer overall survival of females in the world (18) cannot be explained by the atherosclerotic

effects of smoking and alcohol alone, instead it may be explained by higher physical efforts of male sex in life that may terminate with an exaggerated sickling and vascular endothelial damage in early years of life (19).

RA is a common and chronic syndrome, characterized by non-specific but usually symmetric inflammation and synovial hypertrophy of the peripheral joints, potentially terminating with progressive destruction of articular and periarticular tissues with or without systemic manifestations (20). It typically affects small joints of the hands and feet, but it can also affect larger joints (21). Fever, subcutaneous and visceral nodules, pleural and pericardial effusions, lymphadenopathy, splenomegaly, cytopenias, and episcleritis are just some of the samples of the extra-articular manifestations. Diagnosis is based on duration of symptoms, joint distribution, acute phase reactants, and autoantibodies including RF and anti-CCP (22). The presence of clinical or subclinical synovitis seen with ultrasonography or MRI is essential for diagnosis. RA can sometimes present with a large joint monoarthritis or oligoarthritis. In cases presenting with monoarthritis, careful assessment for differential diagnosis is needed, particularly in the elderly patients where other conditions such as gout, calcium pyrophosphate deposition disease, and osteoarthritis are common (23). Early referral of patients with suspected synovitis, particularly in small joints of hands and feet, is important in long-term outcomes (24). On the other hand, RA may mimic several systemic disorders, particularly in young and middle-aged females due to the extra-articular manifestations. According to our experiences, the diagnosis of RA requires highly trained specialists who are able to differentiate early symptoms of RA from other pathologies, particularly from SLE. SLE can be distinguished by the characteristic skin lesions on light-exposed areas, oral aphthous lesions, nonerosive arthritis, positive antibodies to double-stranded DNA, renal and central nervous system involvement, and thrombocytopenia. Especially clinicians in the hematology clinics should be aware of SLE due to the frequent thrombocytopenia in differential diagnosis with idiopathic thrombocytopenic purpura. Although RA and SLE have similar agents in the treatment protocol, antinuclear antibody and anti-double-stranded DNA antibody should be studied in every patient suspected with RA. According to our observations, methotrexate may be the simplest, cheapest, and one of the most effective treatment regimens for both disorders. It can suppress inflammation and may allow reduction of corticosteroid doses. It can be used orally. In the course of severe active diseases, methotrexate should be used early since its benefit often begins in 3 to 4 weeks. It can be given 2.5 to 20 mg in a single dose once weekly, starting at 7.5 mg/wk and gradually increased as needed.

SCDs are severe inflammatory processes terminating with significant health problems in early years of life in both genders (25). For example, menarche is significantly retarded in females with the SCDs (26). Additionally, the severe and continuous endothelial inflammation all over the body causes an overlapping chronic disease anemia. Furthermore, end-organ insufficiencies can even suppress

the immune system of the patients. Acute sinusitis, tonsillitis, and urinary tract infections are the common causes of acute painful crises and hospitalizations, and they can rapidly progress into the severe and life-threatening infections including pneumonia, meningitis, and sepsis due to the relative immunodeficiency in such patients (27). Tonsillary hypertrophy is a frequent physical examination finding that may be the result of a prolonged infectious process due to the relative immunodeficiency of such patients (28). Severe and prolonged endothelial inflammation induced prominent weight loss and cachexia are also common in them (4). Autosplenectomy, recurrent painful crises, frequent hospitalizations, invasive procedures, RBCs supports, medications, prevented normal daily activities, and an eventually suppressed mood of the body can even suppress the immune system of the body (29, 30). In another definition, SCDs may cause moderate to severe immunosuppression with several mechanisms in the human body.

As a conclusion, SCDs are severe and continuous inflammatory processes on vascular endothelium, particularly at the capillary level, and terminate with end-organ failures in early years of life. Beside that, SCDs may cause moderate to severe immunosuppression by several mechanisms that may be the cause of significantly lower prevalence of RA in the SCDs.

References

- Eckel RH, Grundy SM, Zimmet PZ. The metabolic syndrome. *Lancet* 2005; 365(9468): 1415-1428.
- Helvacı MR, Kaya H, Sevinc A, Camcı C. Body weight and white coat hypertension. *Pak J Med Sci* 2009; 25(6): 916-921.
- Helvacı MR, Gokce C, Davran R, Akkucuk S, Uğur M, Oruc C. Mortal quintet of sickle cell diseases. *Int J Clin Exp Med* 2015; 8(7): 11442-11448.
- Helvacı MR, Kaya H. Effect of sickle cell diseases on height and weight. *Pak J Med Sci* 2011; 27(2): 361-364.
- Zhao J, Su Y, Li R, Ye H, Zou Q, Fang Y, et al. Classification criteria of early rheumatoid arthritis and validation of its performance in a multi-centre cohort. *Clin Exp Rheumatol* 2014; 32(5): 667-73.
- Hochberg MC. Updating the American College of Rheumatology revised criteria for the classification of systemic lupus erythematosus. *Arthritis Rheum* 1997; 40(9): 1725.
- Vestbo J, Hurd SS, Agustí AG, Jones PW, Vogelmeier C, Anzueto A, et al. Global strategy for the diagnosis, management, and prevention of chronic obstructive pulmonary disease: GOLD executive summary. *Am J Respir Crit Care Med* 2013; 187(4): 347-65.
- Fisher MR, Forfia PR, Chamera E, Houston-Harris T, Champion HC, Girgis RE, et al. Accuracy of Doppler echocardiography in the hemodynamic assessment of pulmonary hypertension. *Am J Respir Crit Care Med* 2009; 179(7): 615-621.
- Vandemergel X, Renneboog B. Prevalence, aetiologies and significance of clubbing in a department of general internal medicine. *Eur J Intern Med* 2008; 19(5): 325-329.
- Schamroth L. Personal experience. *S Afr Med J* 1976; 50(9): 297-300.
- Mankad VN, Williams JP, Harpen MD, Mancı E, Longenecker G, Moore RB, et al. Magnetic resonance imaging of bone marrow in sickle cell disease: clinical, hematologic, and pathologic correlations. *Blood* 1990; 75(1): 274-283.
- Helvacı MR, Aydin LY, Aydin Y. Digital clubbing may be an indicator of systemic atherosclerosis even at microvascular level. *HealthMED* 2012; 6(12): 3977-3981.
- Yawn BP, Buchanan GR, Afeniyi-Annan AN, Ballas SK, Hassell KL, James AH, et al. Management of sickle cell disease: summary of the 2014 evidence-based report by expert panel members. *JAMA* 2014; 312(10): 1033-1048.
- Helvacı MR, Aydin Y, Ayyıldız O. Hydroxyurea may prolong survival of sickle cell patients by decreasing frequency of painful crises. *HealthMED* 2013; 7(8): 2327-2332.
- Platt OS, Brambilla DJ, Rosse WF, Milner PF, Castro O, Steinberg MH, et al. Mortality in sickle cell disease. Life expectancy and risk factors for early death. *N Engl J Med* 1994; 330(23): 1639-1644.
- Charache S, Scott JC, Charache P. "Acute chest syndrome" in adults with sickle cell anemia. Microbiology, treatment, and prevention. *Arch Intern Med* 1979; 139(1): 67-69.
- Davies SC, Luce PJ, Win AA, Riordan JF, Brozovic M. Acute chest syndrome in sickle-cell disease. *Lancet* 1984; 1(8367): 36-38.
- Mathers CD, Sadana R, Salomon JA, Murray CJ, Lopez AD. Healthy life expectancy in 191 countries, 1999. *Lancet* 2001; 357(9269): 1685-1691.
- Helvacı MR, Ayyıldız O, Gundogdu M. Gender differences in severity of sickle cell diseases in non-smokers. *Pak J Med Sci* 2013; 29(4): 1050-1054.
- Aletaha D, Neogi T, Silman AJ, Funovits J, Felson DT, Bingham CO 3rd, et al. 2010 Rheumatoid arthritis classification criteria: an American College of Rheumatology/European League Against Rheumatism collaborative initiative. *Arthritis Rheum* 2010; 62(9): 2569-81.
- Kourilovitch M, Galarza-Maldonado C, Ortiz-Prado E. Diagnosis and classification of rheumatoid arthritis. *J Autoimmun* 2014; 48-49: 26-30.
- Sun J, Zhang Y, Liu L, Liu G. Diagnostic accuracy of combined tests of anti cyclic citrullinated peptide antibody and rheumatoid factor for rheumatoid arthritis: a meta-analysis. *Clin Exp Rheumatol* 2014; 32(1): 11-21.
- Smolen JS, Aletaha D, Barton A, Burmester GR, Emery P, Firestein GS, et al. Rheumatoid arthritis. *Nat Rev Dis Primers* 2018; 4: 18001.
- Evans J, Negoescu A. Early referral improves long-term outcomes in rheumatoid arthritis. *Practitioner* 2017; 261(1804): 21-5.
- Helvacı MR, Yaprak M, Abyad A, Pocock L. Atherosclerotic background of hepatosteatosis in sickle cell diseases. *World Family Med* 2018; 16(3): 12-18.
- Helvacı MR, Davarci M, İnci M, Yaprak M, Abyad A, Pocock L. Chronic endothelial inflammation and priapism in sickle cell diseases. *World Family Med* 2018; 16(4): 6-11.

27. Helvacı MR, Acipayam C, Aydoğan A, Akkucuk S, Oruc C, Gokce C. Acute chest syndrome in severity of sickle cell diseases. *Int J Clin Exp Med* 2014; 7(12): 5790-5795.
28. Helvacı MR, Gokce C, Davran R, Acipayam C, Akkucuk S, Ugur M. Tonsilectomy in sickle cell diseases. *Int J Clin Exp Med* 2015; 8(3): 4586-4590.
29. Helvacı MR, Acipayam C, Davran R. Autosplenectomy in severity of sickle cell diseases. *Int J Clin Exp Med* 2014; 7(5): 1404-1409.
30. Helvacı MR, Aydoğan A, Akkucuk S, Oruc C, Ugur M. Sickle cell diseases and ileus. *Int J Clin Exp Med* 2014; 7(9): 2871-2876.

Using Physical Activities for Improving Spatial Relations of Students with Down Syndrome

Lama Bendak

Correspondence:

Dr Lama Bendak
Faculty of Education, Lebanese University,
Beirut,
Lebanon
Email: lamabendak@gmail.com

Received: December 20, 2017; Accepted: July 2, 2018; Published: August 1, 2018

Citation: Lama Bendak. Using Physical Activities for Improving Spatial Relations of Students with Down Syndrome. *World Family Medicine*. 2018; 16(8): 38-45. DOI: 10.5742/MEWFM.2018.93487

Abstract

The purpose of this study is to highlight the importance of physical activities for Down syndrome students which will reflect positively on their spatial relations. The quantitative approach was adopted where the total number of the Down syndrome students in the field of study was 10, from two private schools. The study is limited to grades 1, 2 and 3 students, whose ages range from 6.4 to 10.11 years. The students were divided into two groups where the control group was 5 Down syndrome students and the experimental group was also 5 Down syndrome students. The measuring instrument or tool that was used in this study was the Woodcock-Johnson III, Test of Achievement limited to the spatial relations section. A pretest was done on all 10 students during the first trimester of the school year. Then the physical activities intervention was applied for two trimesters. After that, the posttest was applied and the results were submitted to analysis, where the means and standard deviations, the independent samples T- test, and the paired samples T- test were calculated. The results of this study showed statistical differences to the benefit of the experimental group over the control group.

Key words: Down syndrome, spatial relations, physical activities, Woodcock-Johnson III, test of achievement-spatial relations

Introduction

The World Health Organization (WHO) defined physical activity as any bodily movement produced by skeletal muscles that requires energy expenditure. The term “physical activity” should not be mistaken with “exercise”. Exercise, is a subcategory of physical activity that is planned, structured, repetitive, and purposeful in the sense that the improvement or maintenance of one or more components of physical fitness is the objective. Physical activity includes exercise as well as other activities which involve bodily movement and are done as part of playing, working, active transportation, house chores and recreational activities.

The pedagogical areas of physical education and physical education for individuals with disabilities (adapted physical education) should be based on what we know about how people learn and control movements (Hoffman, 2013). On the other hand, motor behavior also differs specifically from sport psychology in that sport psychology typically studies elite athletes in competitive settings whereas motor behavior studies people of all skill levels (including elite athletes) (Hoffman, 2013).

According to the British Association of Occupational Therapists (BAOT) spatial awareness is the ability to be aware of oneself in space. It is an organized knowledge of objects in relation to oneself in that given space. Spatial awareness also involves understanding the relationship of these objects when there is a change of position. It can therefore be said that the awareness of spatial relationships is the ability to see and understand two or more objects in relation to each other and to oneself. This is a complex cognitive skill that children need to develop at an early age. Spatial awareness does come naturally to most children but some children have difficulties with this skill and there are things that can be done to help improve spatial awareness.

Any spatial situation can be approached either categorically; the window is to my left, or coordinately, the glass is 20 cm away from the bottle. Since the first description of the distinction between categorical and coordinate spatial relation processing, it has often been shown that they are processed by at least partially different underlying mechanisms, mainly located in the left and right hemisphere, respectively (Van Der Ham, I., Postma, A., Laeng, B. 2014).

Down syndrome (sometimes called Down's syndrome) is a condition in which a child is born with an extra copy of their 21st chromosome, hence its other name, trisomy 21. This causes physical and mental developmental delays and disabilities. In all cases of reproduction, both parents pass their genes on to their children. These genes are carried in chromosomes. When the baby's cells develop, each cell is supposed to receive 23 pairs of chromosomes, for 46 chromosomes total. Half of the chromosomes are from the mother, and half are from the father. In children with Down syndrome, one of the chromosomes doesn't separate properly. The baby ends up with three copies, or an extra partial copy, of chromosome 21, instead of two. This extra chromosome causes problems as the brain and physical features develop. According to the National Down Syndrome Society (NDSS), about 1 in 700 babies in the United States is born with Down syndrome. It's the most common genetic disorder in the United States.

The Diagnostic and Statistical Manual of Mental Disorders DSM-5, places intellectual disability under the Neurodevelopmental Disorders section; which was previously called Mental Retardation, Intellectual Disability and refers to a disorder that starts during the developmental period (American Psychiatric Association, 2013). It consists of certain intellectual deficits and challenges handling aspects of daily life like school, work, home, social life, and health, among other things. Intellectual disability (ID) is an explanatory phrase for sub standard intelligence that occurs below age eighteen, which is the developmental period. According to DSM-5, there are three criteria that must be fulfilled in order for the diagnosis of ID.

(A) Deficits in intellectual functions, such as reasoning, problem solving, planning, abstract thinking, judgment, academic learning, and learning from experience, confirmed by both clinical assessment and individualized, standardized intelligence testing.

(B) Deficits in adaptive functioning that result in failure to meet developmental and socio-cultural standards for personal independence and social responsibility. Without ongoing support, the adaptive deficits limit functioning in one or more activities of daily life, such as communication, social participation, and independent living, across multiple environments, such as home, school, work, and community.

(C) Onset of intellectual and adaptive deficits during the developmental period. (American Psychiatric Association, 2013).

The various levels of severity (mild, moderate, severe, profound) are defined on the basis of adaptive functioning,

and not IQ scores, because it is adaptive functioning that determines the level of support required. This applies to students with Down syndrome.

If students are to achieve the highest level of success, they must receive instructions and activity that is purposeful, carefully planned and implemented in a motivational and student-centered manner. Planning begins with the development of program goals and sequential listing of activities both within and between grade levels (Carpenter, 2000). Moreover, we should give them a good model to imitate. James Arthur Baldwin said that children have never been very good at listening to their elders, but they have never failed to imitate them (Silver, 2012).

Imitation is not limited to the elders, but also includes peers and all people around the child, even to characters in movies and games. A major reason for including pupils with Special Educational Needs and Disabilities SEND in mainstream schools is social interaction with other children. When they learn and play among other children of the same age, pupils gain good models of appropriate play, language, and behavior (Briggs, 2016). Led by a teacher or a specialist, classes will help to some extent to develop some skills.

But pupils also need opportunities to try out what they have learned during the interventions and to generalize their new skills in different situations. They need the chance to play (Briggs, 2016). This will boost the development of the child also on the psychological level.

It is good to begin building a foundation of self-efficacy, autonomy, and growth mindsets in children while they are young (Silver, 2012). There are a range of therapies used in some special educational provisions which complement and/or extend activities in classrooms. These includes: Hydrotherapy, Physiotherapy, Rebound therapy, Light therapy, Sound therapy, and Music therapy (Martin-Denham, 2015), two of which were used in this research; sound and rebound therapy. Rebound therapy is the gentle bouncing with pupils on a trampoline. It provides a very powerful sensory experience, which many pupils love (Martin-Denham, 2015).

It appears that naturally occurring hormones and chemicals may be the best method for helping increase attention. During physical activities, endorphins are released in the brain. Endorphins are hormone-like compounds that regulate mood, pleasure, and pain. That same burst of activity also elevates the brain's dopamine, norepinephrine, and serotonin levels. These brain chemicals affect focus and attention (Johnson & Jones, 2016).

A school in Colorado starts off students' days with 20 minutes of aerobic exercise to increase alertness. If they act up in class, they aren't given time-out but time-in, 10 minutes of activity on a stationary bike or an elliptical trainer. The result is that kids realize they can regulate their mood and attention through exercise (Johnson & Jones, 2016).

Communication which over-emphasizes what the child cannot do may damage partnership between home and school. There is of course a need to record the child's next steps' but these should be small, measurable, achievable, realistic (SMART targets) (Glazzard, Stokoe, Hughes, Netherwood, Neve, 2015).

In addition to social and emotional information, your brain processes sensory movement information, going through the stages of input, processing, and output (Gaus, 2011). In grade school, they teach that we have five senses; sight, hearing, smell, taste, and touch. While we do indeed have all of those senses, the fifth one, touch, is really part of a trio of senses that are sometimes called the body senses. They include touch, balance, and motion and are called body senses because they involve information being communicated about and between the brain and the areas below the neck. These are distinguished from sight, hearing, smell, and taste because for them all communication occurs in the head and about the head region. This means that we really have seven senses. Each of these has an 'input device' (sense organ), which is a specialized part of the body with built-in sensors (receptor cells) to pick up a particular type of physical information (Gaus, 2011).

The sensors in those organs translate physical information into a nerve impulse that is sent via specialized pathways to the brain, where it can be processed. The way this happens for each of the seven senses is described below and is also summarized in the table called "Our Seven Senses" which appears below (Gaus, 2011).

Balance involves combining information about body orientation in relation to the ground, and it relies on the physical presence of gravity. Motion translates information about the physical position of the body and each separate part (e.g. arms, legs) that is translated by special cells in our joints and muscles. Movement is detected whenever the position changes. This is called kinesthetic information, and it is sent to the brain via a complex network of neural pathways channeled through the spinal cord (Gaus, 2011).

Literature Review

A case study on teaching perspective-taking skills to an adult with Down syndrome (Montoya-Rodriguez, McHugh, 2017) states that perspective-taking has for many years

attracted considerable research attention in the mainstream cognitive developmental literature, under the rubric of Theory of Mind. Recently, the modern behavioral approach to human language and cognition known as Relational Frame Theory suggests that perspective-taking is a form of generalized operant responding involving deictic relations, such as I versus YOU, HERE versus THERE and NOW versus THEN, with different levels of relational complexity. People with intellectual disability often lack perspective-taking, and this deficit can detrimentally impact the quality of their social interactions. The current study is the first to train an adult with Down syndrome in deictic relational responding. The participant was exposed to multiple exemplars consisting of interactive tasks and feedback aimed at training reversed I-YOU, HERE-THERE and NOW-THEN deictic relations. The participant reached mastery on I-YOU, HERE-THERE and NOW-THEN reversed tasks. In line with previous research in the area of deictic relations, more training trials on NOW-THEN relations was required for the participant to meet criterion than I-YOU or HERE-THERE relations. Implications for the use of training deictic relations with individuals diagnosed with Down syndrome are discussed.

Another study on Visuo-spatial knowledge acquisition in individuals with Down syndrome entailed: The role of descriptions and sketch maps (Meneghetti, Lanfranchi, Carretti, Toffalini, 2017) states that few studies on individuals with Down syndrome (DS) have explored how they learn space. The present study examined space learning from verbal descriptions in individuals with DS, and explores the role of external cues (such as a sketch map). Twenty-eight individuals with DS and 28 matched typically-developing (TD) children listened to route or survey descriptions with or without seeing a corresponding sketch map (Description + Sketch Map [D + SM] and Description alone [D], respectively). After hearing each description, they performed tasks that involved recognizing, arranging sequentially, and locating landmarks. The results showed that individuals with DS performed less well in recognizing landmarks and arranging them sequentially. The D + SM condition produced general benefits in both groups' accuracy, though the improvement in locating landmarks was greater in the TD than in the DS group. In both groups, the D + SM condition prompted a better performance than the D condition when participants arranged landmarks sequentially after hearing a description from a route

Our Seven Senses

| Sense/ Common Term | Technical Term | Organ or Sensor |
|-----------------------|----------------|--------------------|
| Sight | Visual | Eye |
| Hearing | Auditory | Ear |
| Smell | Olfactory | Nose |
| Taste | Gustatory | Tongue plus nose |
| Touch | Tactile | Skin |
| Balance | Vestibular | Inner ear |
| Motion | Kinesthetic | Joints and muscles |

perspective, but not from a survey perspective. Overall, our results show that individuals with DS benefited when a spatial description was associated with a corresponding sketch map, albeit to a lesser degree than TD children. The findings are discussed in the light of the literature on DS and on spatial cognition in the TD domain.

Another study on Visuo-spatial ability in individuals with Down syndrome entailed: Is it really a strength? (Yang, Merrill, 2014). Based on that Down syndrome (DS) is associated with extreme difficulty in verbal skills and relatively better visuo-spatial skills. Indeed, visuo-spatial ability is often considered a strength in DS. However, it is not clear whether the visuo-spatial skills strength is only relative to the poor verbal skills, or, more impressively, relative to cognitive ability in general. To answer this question, an extensive literature review of studies on visuo-spatial abilities in people with Down syndrome from January 1987 to May 2013 was conducted. Based on a general taxonomy of spatial abilities patterned after Lohman, Pellegrino, Alderton, and Regian (1987) and Carroll (1993) and existing studies of DS, five different domains of spatial abilities – visuo-spatial memory, visuo-spatial construction, mental rotation, closure, and wayfinding were included. A total of 49 studies including 127 different comparisons were evaluated. Most comparisons involved a group with DS vs. a group with typical development matched on mental age and compared on a task measuring one of the five visuo-spatial abilities. Although further research is needed for firm conclusions on some visuo-spatial abilities, there was no evidence that visuo-spatial ability is a strength in DS relative to general cognitive ability. Rather, the review suggests an uneven profile of visuo-spatial abilities in DS in which some abilities are commensurate with general cognitive ability level, and others are below.

Moreover, a study on Spatial-simultaneous and spatial-sequential working memory in individuals with Down syndrome entailed: The effect of configuration. Research in Developmental Disabilities (Carretti, B., Lanfranchi, S. Mammarella, I. 2013). Earlier research showed that visuo-spatial working memory (VSWM) is better preserved in Down syndrome (DS) than verbal WM. Some differences emerged, however, when VSWM performance was broken down into its various components, and more recent studies revealed that the spatial-simultaneous component of VSWM is more impaired than the spatial-sequential component. The difficulty of managing more than one item at a time is also evident when the information to be recalled is structured. To further analyze this issue, the advantage of material being structured in spatial-simultaneous and spatial-sequential tasks was investigated by comparing the performance of a group of individuals with DS and a group of typically-developing children matched for mental age. Both groups were presented with VSWM tasks in which both the presentation format (simultaneous vs. sequential) and the type of configuration (pattern vs. random) were manipulated. Findings indicated that individuals with DS took less advantage of the pattern configuration in the spatial-simultaneous task than TD children; in contrast, the two groups' performance did not differ in the pattern configuration of the spatial-sequential task. Taken together,

these results confirmed difficulties relating to the spatial-simultaneous component of VSWM in individuals with DS, supporting the importance of distinguishing between different components within this system.

A study entitled Profiles of visual perceptual functions in Down syndrome (Ting Wan, Y., Sui Chiang, C., Chia-Ju Chen, S., Chung Wang, C., Pay Wuang, Y. 2015) aimed to investigate the visual perceptual functions measured by the Test of Visual Perceptual Skill-Third Edition (TVPS-3) in Down syndrome (DS). Seventy individuals with DS, seventy with typical development (TD), and forty mental-age-matched participants with intellectual disabilities (ID) were recruited for the assessment session. Significant between-group differences in TVPS-3 were observed between either DS or ID and TD groups. There was no significant difference on TVPS-3 between DS and ID groups. Implications for clinical professionals and recommendations for further research are discussed.

Another study tackled Grouping, semantic relation and imagery effects in individuals with Down syndrome (Smith, E., Jarrold, C. 2014). Down syndrome (DS) is associated with a specific verbal short-term memory (STM) deficit. This study explored the effects of grouping, semantic relations and visual presentation upon verbal STM recall performance in a group of 15 individuals with DS and 15 vocabulary-matched typically developing (TD) children. Participants were presented with memoranda in either a temporally grouped schedule, such that items were grouped as pairs, or in an equally spaced presentation schedule. The two items constituting each pair were either semantically related or unrelated. Performance across these conditions was compared in verbal or verbal plus visual presentation modes. Significant memory recall benefits were observed across populations as a result of temporal grouping, semantic relations and verbal and visual combined presentation. However, a reduced benefit of semantic relation in the DS group compared to the TD group indicated that those with DS were less influenced by LTM relational knowledge. In addition, those with DS only experienced a grouping benefit during verbal and visual combined presentation, in contrast to the TD group who experienced grouping benefits throughout. This indicates that individuals with DS are poorer at encoding temporal context for purely verbal memoranda. These findings were replicated in a follow-up experiment, aimed at aligning baseline performance in the two populations. This study provides encouraging evidence that, despite their difficulties in some areas, individuals with DS can benefit from the use of grouping and LTM knowledge to assist their verbal STM performance under certain circumstances.

A different study entitled Do Equine-assisted Physical Activities Help to Develop Gross Motor Skills in Children with the Down Syndrome? Short-term Results (Voznesensky, S., Rivera-Quinato, J., Bonilla-Yacelga, K., Cedeño-Zamora, M. 2016) was reviewed. Equine-assisted physical activities are believed to improve the physical, psychological, and social wellbeing of special needs populations. A study was conducted to assess the effect of an equine-

assisted physical activity and an adaptive horseback riding program in comparison with conventional adapted physical education designed to develop gross motor skills measured by the Gross Motor Function Measure (GMFM-88) in children with Down syndrome in a special education institution. According to the fitted ordinary least squares and robust regression models, the equine-assisted activities program had, on average, a large positive effect on children's gross motor development in comparison to the conventional physical education in the control group for 3 months. Evidence is provided with regard to the short-term improvement of the gross motor function in children with Down syndrome participating in equine-assisted activities, in comparison to regular adapted physical education, in a special education institution. Further research is needed to assess medium and long term effects of equine-assisted activities on gross motor development in children with Down syndrome.

Another research entitled Associations of physical activity with fatness and fitness in adolescents with Down syndrome: The UP&DOWN study (Gomez, R., Gómez, D., Villagra, A., Fernhall, B., Veiga, O. 2015) was reviewed. It aimed to examine the associations of objectively measured physical activity (PA) with several markers of fatness and fitness in a relatively large sample of adolescents with Down syndrome (DS). This study comprised a total of 100 adolescents with DS (37 females) aged 11–20 years-old, and a sex-matched sample of 100 adolescents without disabilities, participating in the UP&DOWN study. The ALPHA health-related fitness test battery for adolescents was used to assess fatness and fitness. PA was measured by accelerometer. Adolescents with DS had higher fatness and significantly lower fitness levels in all variables measured than adolescents without DS (all $p < 0.05$). Moderate-to-large effects were observed in fatness variables ($d = 0.65$ – 1.42), but particularly large values were found in fitness variables ($d = 2.05$ – 2.43). In addition, PA levels were not associated with fatness variables, whereas total PA and vigorous PA were associated with all fitness variables ($p < 0.05$), and moderate-vigorous PA (MVPA) was associated with muscular fitness ($p < 0.05$), after adjusting for potential confounders. Further analysis revealed that there were differences in fitness by tertiles of vigorous PA between the lowest and the highest groups in all fitness variables (all $p < 0.05$). However, no significant differences were found in fitness by tertiles of MVPA according with PA guidelines (≥ 60 min in MVPA). Our findings indicate that PA levels are not associated with fatness variables, whereas high PA levels, in particular vigorous PA, are positively associated with high fitness in adolescents with DS.

Statement of Research Question

Based on the importance of physical activities in developing many skills for all students and especially those with special need, it was important to highlight its efficiency with down syndrome students who are integrated in regular schools and are considered high functioning; that is considered before as mild to average cases of intellectually disabled. This arouses the following research question:

Do the physical activities improve the spatial relations of Down syndrome students?

Design and Method

A quantitative method was used in this research. A total of ten Down syndrome students were recruited to participate in this study from two private schools in Lebanon. All ten participants were grade 1, 2 or 3 students with their ages ranging between 6.4 and 10.11 years. The ten participants were divided into two groups, a control group of five participants and an experimental group of another five participants. The pretest, the spatial relations section of Woodcock-Johnson III Test of Achievement, was applied during the first trimester of the 2017-18 school year. Then the physical activities intervention was implemented on the experimental group for two trimesters at a rate of two 20 minute sessions per week. The level of physical activities was set for each student based on his/her average result at the pretest.

The physical activities were planned to cover all seven senses that were previously stated, with a highlight on motion, balance, rebound, and sound games. Bryce-Clegg (2013) has suggested 50 possible outdoor activities. Some of these activities were adopted for the intervention group based on the personal needs of every Down syndrome student in the experimental group. Moreover, activities included card games that were limited to some Down syndrome students who got results on the spatial relations test equivalent and above six years old performance. Decker & Mize (2002) included card games in their book as walking games and activities that suit six to eight years old students. Moreover, blocks were used in the intervention, which is based on structured block play. In observational studies, children who spend more free time playing with puzzles and building blocks score higher on tests of spatial ability (Levine et al., 2012).

Then a similar posttest was applied and the results were analyzed. Descriptive statistics and independent samples t- test were used to explore and assess the results. A significance level (α value) of 0.05 was considered in the current study.

Results

Descriptive statistics of age of participants and their test scores in the control group are presented in Table 1 while those of the experimental group are presented in Table 2. Participants' test scores are illustrated in Figure 1 for the control group and Figure 2 for the experimental group.

Table 1: Spatial relations tests' results of the control group

| Initials | Initial Chron. Age (Gr. Level) | Initial Test Score | Initial Age (Gr.) Equiv. | End Chron. Age (Gr. Level) | Final Test Score | Final Age (Gr.) Equival. | Difference in Score |
|----------|--------------------------------|--------------------|--------------------------|----------------------------|------------------|--------------------------|---------------------|
| F.R. | 6.8 (1.2) | 39 | 5.2 (<K.0) | 7.2 (1.8) | 42 | 5.4 (<K.0) | +3 |
| M.K. | 7.6 (1.2) | 45 | 5.8 (K.3) | 8.0 (1.8) | 47 | 5.11(K.6) | +2 |
| L.T. | 7.9 (2.2) | 47 | 5.11 (K.6) | 8.5 (2.8) | 50 | 6.4 (1.1) | +3 |
| A.M. | 9.8 (3.2) | 54 | 7.0 (1.8) | 10.2 (3.8) | 57 | 7.7 (2.5) | +3 |
| C.S. | 10.5 (3.2) | 58 | 7.10 (2.8) | 10.11 (3.8) | 59 | 8.1 (3.1) | +1 |

Table 2: Spatial relations tests' results of the experimental group

| Initials | Initial Chron. Age (Gr. Level) | Initial Test Score | Initial Age (Gr.) Equiv. | End Chron. Age (Gr. Level) | Final Test Score | Final Age (Gr.) Equival. | Difference in Score |
|----------|--------------------------------|--------------------|--------------------------|----------------------------|------------------|--------------------------|---------------------|
| D.A. | 6.9 (1.2) | 43 | 5.5 (K.0) | 7.3 (1.8) | 47 | 5.11 (K.6) | +4 |
| Z.H. | 7.0 (1.2) | 44 | 5.7 (K.2) | 7.6 (1.8) | 48 | 6.0 (K.7) | +4 |
| E.G. | 7.7 (2.2) | 48 | 6.0 (K.7) | 8.1 (2.8) | 53 | 6.9 (1.6) | +5 |
| T.S. | 8.5 (2.2) | 48 | 6.0 (K.7) | 8.11 (2.8) | 54 | 7.0 (1.8) | +6 |
| J.B. | 10.1 (3.2) | 52 | 6.7 (1.4) | 10.7 (3.8) | 58 | 7.10 (2.8) | +6 |

The spatial relations results of both control and experimental groups on the pretest and posttest are displayed in the following figures.

Figure 1: Spatial relations test scores of control group

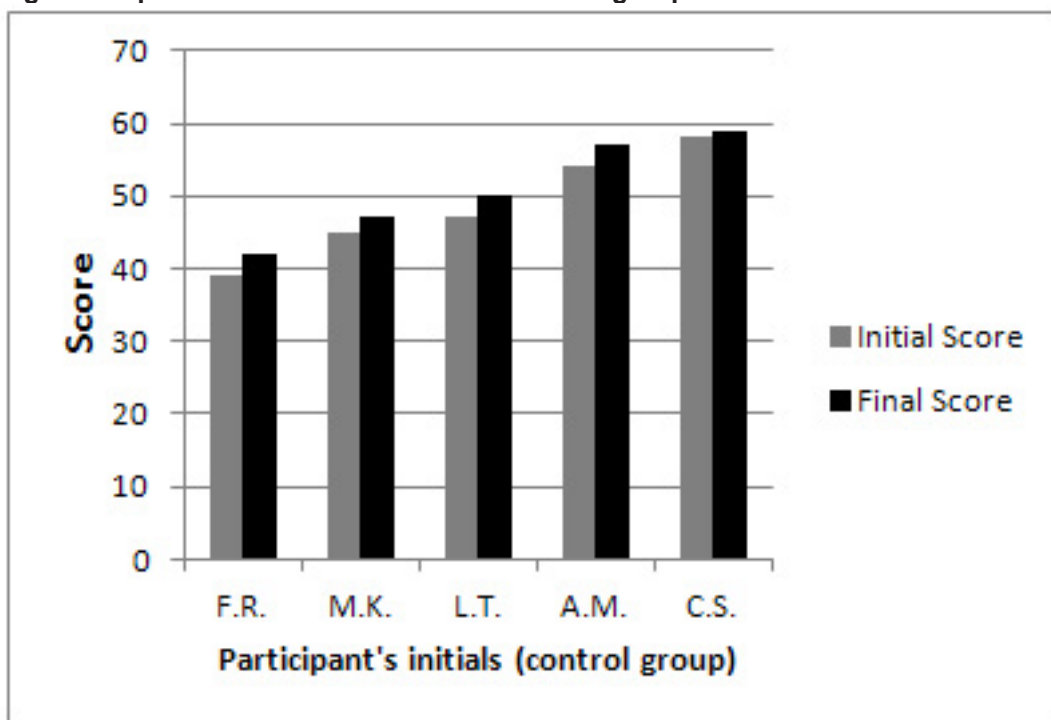
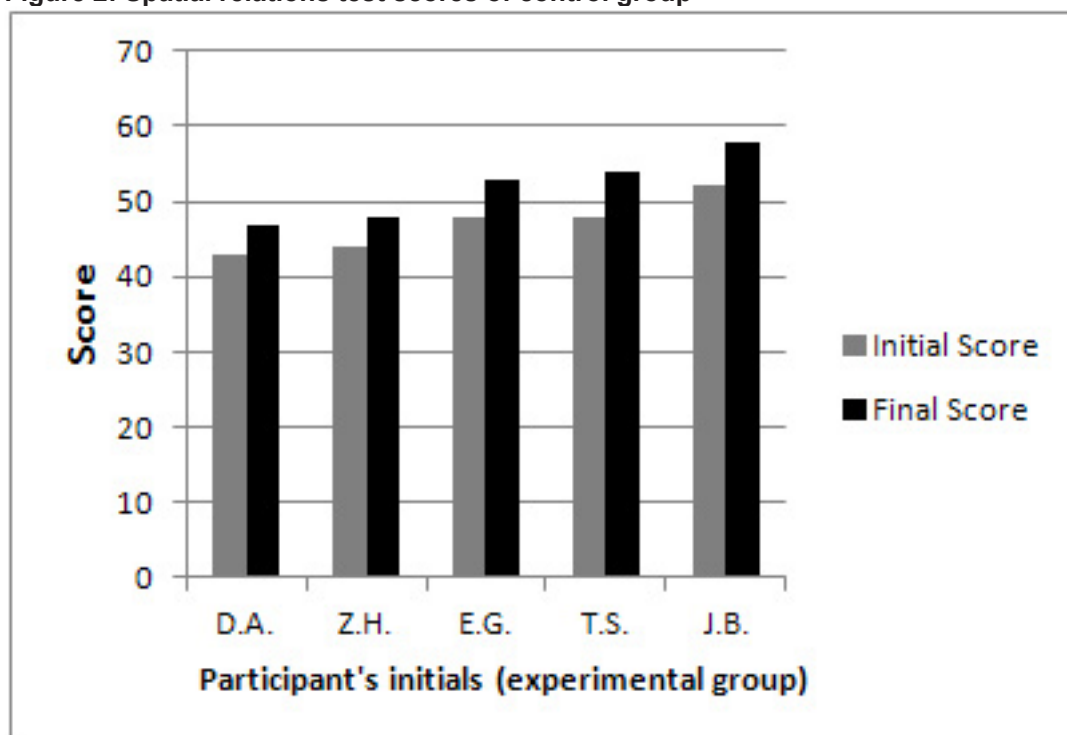


Figure 2: Spatial relations test scores of control group

Then improvement in test scores of all participants within the control group were compared to those of the experimental group using an unpaired single-sided t-test. The test showed that the experimental group showed significantly better performance in spatial relations test score than the control group ($p=0.007$).

To calculate the effect size of the t-test, Cohen's d value was used. This value is calculated using the formula: $Cohen's\ d = (M_2 - M_1) / SD_{pooled}$ where M_2 is the mean improvement value of experimental group and M_1 is the mean improvement value of control group. SD_{pooled} was calculated using the formula $SD_{pooled} = \sqrt{((SD_1^2 + SD_2^2) / 2)}$. SD_{pooled} in this case is found to be equal to 0.81 and Cohen's d value to be equal to 1.98. This reflects that physical activities lead to significant improvement in spatial relations test score of children with Down syndrome.

Limitations

The intervention of physical activities for Down syndrome students was limited to school hours, so it would have given a better perspective if they were able to practice at home with their parents or guardians. Moreover, it can be applied during regular classes and physical education hours.

Conclusion

The physical activities intervention did help the Down syndrome students in developing their spatial relations skills. Based on the Woodcock-Johnson III, Test of Achievement limited to the spatial relations section, the experimental group showed significant improvement. This leads us to recommend including physical activities in the individual educational plans of all Down syndrome students

within the courses and have more structured physical education hours in order to boost the spatial relations. This approach lies under the evidence based learning that leads to "good learning".

References

- American Psychiatric Association. (2013). Diagnostic and statistical manual of mental disorders: DSM-5 (5th ed.). Washington, DC: Author.
- Bird, K., Savage, K. (2014). The ANIE: a math assessment tool that reveals learning and informs teaching. Markham, Ont: Pembroke Publishers Ltd.
- Briggs, S. (2016). Meeting special educational needs in primary classrooms: inclusion and how to do it. (2nd ed.). London: Routledge.
- Brown, D., et al. (2013). Engaging students with intellectual disabilities through games based learning and related technologies. Universal Access in Human-Computer Interaction. Applications and Services for quality of life. UAHCI. 8011: 573-582. Springer, Berlin, Heidelberg. doi:10.1007/978-3-642-39194-1_66
- Bryce-Clegg, A. (2013). 50 fantastic ideas for physical activity outdoors. London: Featherstone Education.
- Carretti, B., Lanfranchi, S. Mammarella, I. (2013). Spatial-simultaneous and spatial-sequential working memory in individuals with Down syndrome: The effect of configuration. Research in Developmental Disabilities. 34(1): 669-675. <https://doi.org/10.1016/j.ridd.2012.09.011>
- Carpenter, J. (2000). P.E. teacher's complete fitness and skills development activities program. West Nyack, N. Y.: Parker Publishing Company.
- Decker, J. I., Mize, M. (2002). Walking games and activities. Champaign, Ill
- Gaus, V. (2011). Living well on the spectrum: how to use your strengths to meet the challenges of Asperger

- syndrome/high-functioning autism. New York: The Guilford Press.
- Glazzard, J., Stokoe, J., Hughes, A., Netherwood, A., Neve, L. (2015). Teaching & supporting children with special educational needs & disabilities in primary schools. (2nd ed.). Los Angeles: Sage Publications Inc.
- Gomez, R., Gómez, D., Villagra, A., Fernhall, B., Veiga, O. (2015). Associations of physical activity with fatness and fitness in adolescents with Down syndrome: The UP&DOWN study. *Research in Developmental Disabilities*. 36: 428-436
<https://doi.org/10.1016/j.ridd.2014.10.022>
- Hoffman, S., (2013). Introduction to kinesiology: studying physical activity. (4th ed.). Champaign, IL: Human Kinetics.
- Johnson, B., Jones, M., (2016). Learning on your feet: incorporating physical activity into the K-8 classroom. New York: Routledge.
- Levine, S. C., Ratliff, K. R., Huttenlocher, J., & Cannon, J. (2012). Early puzzle play: A predictor of preschoolers' spatial transformation skill. *Developmental Psychology*, 48(2), 530-542.
<http://dx.doi.org/10.1037/a0025913>
- Martin-Denham, S. (2015). Teaching children & young people with special educational needs & disabilities. Los Angeles: Sage Publications Inc.
- Meneghetti, C., Lanfranchi, S., Carretti, B., Toffalini, E. (2017). Visuo-spatial knowledge acquisition in individuals with Down syndrome: The role of descriptions and sketch maps. *Research in Developmental Disabilities*. 63:46-58
<https://doi.org/10.1016/j.ridd.2017.02.013>
- Montoya-Rodriguez, M., McHugh, L. (2017). Teaching perspective-taking skills to an adult with Down syndrome: A case study. *Journal of Contextual Behavioral Science*. 6(3): 293-297
<https://doi.org/10.1016/j.jcbs.2017.04.012>
- Silver, D. (2012). Fall down 7 times, get up 8: teaching kids to succeed. Thousand Oaks, Calif.: Corwin Press.
- Smith, E., Jarrold, C. (2014). Grouping, semantic relation and imagery effects in individuals with Down syndrome. *Research in Developmental Disabilities*. 35(11): 3162-3174.
<https://doi.org/10.1016/j.ridd.2014.07.061>
- Tilly, K. (2010). Active imagination activity book: 50 sensorimotor activities for children to improve focus, attention, strength, & coordination. Arlington, Tex.
- Ting Wan, Y., Sui Chiang, C., Chia-Ju Chen, S., Chung Wang, C., Pay Wuang, Y. (2015). Profiles of visual perceptual functions in Down syndrome. *Research in Developmental Disabilities*. 37:112-118
<https://doi.org/10.1016/j.ridd.2014.11.008>
- Van Der Ham, I., Postma, A., Laeng, B. (2014). Lateralized perception: The role of attention in spatial relation processing. *Neuroscience & Biobehavioral Reviews*. (45) 142-148.
<https://doi.org/10.1016/j.neubiorev.2014.05.006>
- Voznesensky, S., Rivera-Quinoto, J., Bonilla-Yacelga, K., Cedeño-Zamora, M. (2016). Do Equine-assisted Physical Activities Help to Develop Gross Motor Skills in Children with the Down Syndrome? Short-term Results. *Procedia - Social and Behavioral Sciences*. 233: 307-312
<https://doi.org/10.1016/j.sbspro.2016.10.140> Get rights and content
<http://www.who.int/dietphysicalactivity/pa/en/occupationaltherapyforchildren.over-blog.com/article-spatial-awareness-108726104.html>

Surgical Skills Training with Models

Maurice Brygel

Correspondence:

Associate Professor, Notre Dame Medical School, Australia
Melbourne Hernia Clinic, Melbourne Haemorrhoid and Rectal Bleeding Clinic,
Australia

Email: mbrygel@netspace.net.au

Received: June 20, 2017; Accepted: July 10, 2018; Published: August 1, 2018

Citation: M Brygel. Surgical Skills Training With Models. World Family Medicine. 2018; 16(8): 46-47.

DOI: 10.5742MEWFM.2018.93486

Abstract

The article describes the outcome of a design and development collaboration between a surgeon, a skills laboratory director and a 3D printing manufacturer which has led to the development of an effective medical simulation model for skills acquisition in ingrown toenail procedures.

Key words: Surgery, surgery skills, medical simulations, continuing medical education

Introduction

Until recently surgical procedures and training have been carried out under an apprenticeship style system. Here a student, young doctor or surgical trainee observes, and through a series of steps, incrementally develops the skills needed in performing an entire operation. This process has traditionally been carried out in theatre on live patients.

With technological advances, medico-legal pressures and many new operations being devised the traditional learning model has become outdated.

As a result skills laboratories have been introduced. These range from the most basic skills acquisition such as making incisions, knot tying and suturing, to major surgery. With the introduction of endoscopic surgery and radical new techniques the apprentice system did not work as well. Skills required, such as laparoscopic knot tying, were more technically difficult. The skills laboratory is now used for all types of orthopaedic, vascular and general surgery procedures such as the common gall bladder and hernia operations.

But it is not just for these complex procedures that more training is required. As part of the ongoing pursuit of excellence continuing education became mandatory. It was expected from the profession and also from the community. The development of skills laboratories and training workshops helped achieve these goals.

In medical training, young doctors are not exposed to some of the most basic skills such as the diagnosis of and surgery for skin lesions, ingrown toe nails, suturing, lacerations and drainage of an abscess.

As a result there were many practitioners in both the metropolitan and rural & remote areas deficient in these skills and who required additional training. I have had an interest in teaching these skills and have been designing, producing and conducting training programmes at the

Royal Australasian College of Surgeons for many years. It expanded this training in Victoria, Australia and interstate to cities and rural communities in Queensland.

It was realised early on there was a need to pass on the clinical knowledge and surgical skills which have been handed down from generation to generation. Initially a series of books and videos titled the Video Book of Surgery were developed. However, the doctors still need to do hands-on practice even though the videos demonstrated the techniques.

This resulted in the development of a series of workshops on common conditions seen in general practice. These have a variety of titles including Brygel's Surgi Skills, Surgical Office Skills (SOS), and Skin Cancer Skills.

One particular topic is the treatment of ingrown toenails. Ingrown toenails are a common condition generally affecting adolescents. They usually occur in the big toe and can be quite a painful condition and infection commonly supervenes.

Ingrown toenails can be treated in a variety of ways in the office setting. Surgical treatment can involve simply the removal of the nail edge alone. Phenol can be used to ablate the nail bed. An operation termed wedge resection surgically excises this nail bed. The procedure is commonly performed in the office setting under a local anaesthetic (digital block).

Students and doctors at the tertiary hospitals, where complex surgery is the order of the day, rarely had the opportunity to even see or practise this procedure. Thus these doctors often went to remote & rural areas without the training to implement these techniques.

In recent years a simple synthetic toe model was developed and very low-cost copies are also now available. These have been ineffective as a model of the toe and do not reproduce what is required to simulate the procedure.

The rapid development of 3D printing technology has provided scope for innovation in medical education. With experience in architectural model-making and 3D printing, Ben Croudace, centred in Perth, founded a company called Medimodels to move into the medical model business. As a result he contacted Dr David Lawrence, the manager of the Skills & Education Centre at the Royal Australasian College of Surgeons head office in Melbourne, to discuss opportunities for the development of medical models. On his advice, Ben commenced development of a toe model for teaching the surgical treatment of ingrown toenails. Under the guidance of the A/Prof Brygel, the model went through a series of iterations resulting in a sophisticated model that is now being used in workshops throughout Australia. The model is now being exported to several other countries.

On this model doctors can practice:

1. digital block anaesthesia
2. excision of a nail edge
3. wedge resection (excision of a portion of the nail bed)
4. the use of phenol ablation
5. bandaging
6. post-operative care.

As a result of this interest in ingrown toenails, Brygel's Surgi Skills has developed an online teaching program with videos to support training with the models.



Toe model

Conclusion

The use of simulation and educational technology provides a far improved environment to both demonstrate and practice surgical skills.

References

- (1) Croudace B, Brygel M. The Architecture of Medical Simulation - Collaborative Design Approach brings sophistication to teaching with procedure-specific silicone simulation. . Middle East Journal of Business. 2018; 13(3): 21-23. DOI: 10.5742/MEJB.2018.93467.

