



Middle East Journal of Nursing



July 2022

VOLUME 16 ISSUE 2

ISSN 1834-8742

Chief Editor:

A. Abyad MD,
MPH, AGSF, AFCCHS

Editorial Office:

Abyad Medical Center &
Middle East Longevity Institute
Azmi Street, Abdo Center
PO BOX 618
Tripoli, Lebanon
P + (961) 6 443684
F + (961) 6 443685
E editor@me-jn.com

Publisher:

Ms Lesley Pocock

Publishing Office:

medi+WORLD International
Australia
E lesleypocock@mediworld.com.au

Editorial Enquiries:

aabyad@cyberia.net.lb

Advertising Enquiries:

lesleypocock@mediworld.com.au

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. Publication of any advertisements does not constitute any endorsement by the Publishers and Editors of the product advertised.

The contents of this journal are copyright. Apart from any fair dealing for purposes of private study, research, criticism or review, as permitted under the Australian Copyright Act, no part of this program may be reproduced without the permission of the publisher.

Editorial

- 2 **Chief Editor - A. Abyad**

Original Contribution / Clinical Investigation

- 3 **Assessing Nurse's Attitudes and Practice after Participating in a Vaccination Training Program: A Quantitative Study**
Sadia Munir, Jessie Johnson, Amber Smith, Robyn O'Dwyer, Arlene Masaba, Khalid Elawad, Samya Ahmad, Ebtesam Abdulla, M.M Al Qudah
DOI: 10.5742/MEJN2021.9378022
- 16 **Smoking Causes a Low-Grade Systemic Inflammation in the Human Body**
Mehmet Rami Helvaci, Semih Salaz, Engin Altintas, Atilla Yalcin, Abdulrazak Abyad, Lesley Pocock
DOI: 10.5742/MEJN2021.9378023

Review

- 23 **Factors Affecting the Promotion of Back Care Practices among Nurses Working in Long Term Care Settings: An Integrative Review**
Nagwa Mohamed, Jessie Johnson, Mariam Al Mutawa, Daniel Forgrave
DOI: 10.5742/MEJN2021.9378024
- 33 **Addressing Health Literacy in the Gulf Cooperation Council (GCC) Countries: An Integrative Review Protocol to Summarize the Health Literacy Landscape**
J Johnson, F Khraim, C Wolsey, N Chowdhury, M M H Raihan, T C Turin
DOI: 10.5742/MEJN2021.9378025
- 42 **Positive and Negative Acute Phase Reactants in Smokers**
Mehmet Rami Helvaci, Engin Altintas, Atilla Yalcin, Orhan Ekrem Muftuoglu, Abdulrazak Abyad, Lesley Pocock
DOI: 10.5742/MEJN2021.9378026
- 49 **Effectual Communication and Explanation in Dermatology**
Ebtesam Elghblawi
DOI: 10.5742/MEJN2021.9378027

FROM THE EDITOR



Abdulrazak Abyad
MD, MPH, AGSF, AFCHS
(Chief Editor)
Editorial office:
Abyad Medical Center &
Middle East Longevity Institute
Azmi Street, Abdo Center
PO BOX 618
Tripoli, Lebanon
P + (961) 6 443684
F + (961) 6 443685
E aabyad@cyberia.net.lb
Publishing Office:
medi+WORLD International
Australia
www.me-jn.com

This is the second issue this year with papers dealing with various issues from the region.

Mohamed, N did an integrative review aims to identify the factors that promote back-care practices among nurses working in long-term care settings. This integrative review was guided by Whittemore and Knaff's (2005) framework. Three databases were searched for peer-reviewed studies published between 2011 and 2021 based on set inclusion and exclusion criteria. A hand search was also conducted among the reference lists of the included peer-reviewed articles. The identified articles were critically appraised using the Mixed Methods Appraisal Tool. Data was then extracted, and the various barriers and facilitators of back-care practices were noted based on the three levels of the Socio-Ecological Model: individual, organizational, and environmental.

Three main factors that influence back-care practices include lack of knowledge among nurses about the programs, lack of organizational support, and lack of maneuvering space.

The author concluded that it is imperative that educational sessions related to the safe handling of patients be provided to nurses to increase their knowledge and implementation of appropriate back-care practices. Involving stakeholders in the development and implementation process of back-care programs will encourage the stakeholders to fully understand the importance of the programs.

Johnson, et al., did an integrative review is to assess health literacy within the GCC countries in order to provide a picture of the state of health literacy. The authors stressed that in the world of an ever-evolving face of healthcare practice and policies, it is increasingly becoming more imperative that the greater population is enabled to keep up with the pace of changes and reforms in order for them to understand and further affect change.

Helvaci, et al., did a study on Smoking-induced inflammation in the body. Consecutive daily smokers at least for a period of six months and age and sex-matched non-smokers were taken into the study. Cases with regular alcohol consumption (one drink a day) and patients with inflammatory, infectious, or devastating disorders including eating disorders, malignancies, acute or chronic renal failure, cirrhosis, chronic obstructive pulmonary disease, hyper- or hypothyroidism, or heart failure were excluded. The study included 150 smokers (99 males) and 162 non-smokers. Interestingly, the mean age of the smokers was 45.9 years, and 66.0% of them were male. Although the mean weight, body mass index, systolic and diastolic blood pressures, and hematocrit values were similar in both groups, triglycerides (163.3 versus 151.8 mg/dL, $p<0.05$), low density lipoproteins (LDL) (126.1 versus 117.4 mg/dL, $p<0.05$), erythrocyte sedimentation rate (ESR) (10.8 versus 9.4 mm/h, $p<0.05$), and C-reactive protein (CRP) (2.5 versus 2.1 mg/L, $p<0.05$) values were all higher in the smokers, significantly. On the other hand, high density lipoproteins (HDL) (41.1 versus 44.0 mg/dL, $p<0.05$) and fasting plasma glucose (FPG) (101.9 versus 111.9 mg/dL, $p<0.01$) values were lower in the smokers, significantly. The authors concluded that smoking causes a low-grade systemic inflammation on vascular endothelium terminating with an accelerated atherosclerosis-induced end-organ insufficiencies in the body.

Plasma triglycerides, LDL, ESR, and CRP may be positive whereas HDL and FPG negative APR indicating the inflammatory effects of smoking in the human body.

Helvaci, et al., tried to understand whether or not there are some positive and negative acute phase reactants (APR) indicating the possible inflammatory effects of smoking on vascular endothelium.

Consecutive daily smokers at least with a history of one pack-year and age and sex-matched non-smokers were taken into the study. Cases with regular alcohol consumption (one drink a day) and patients with inflammatory, infectious, or devastating disorders, or heart failure were excluded.

The study included 247 smokers (173 males) and 167 non-smokers. Interestingly, the mean age of the smokers was 46.2 years, and 70.0% of them were males. Although the mean body weight, body mass index, systolic and diastolic blood pressures, and hematocrit values were similar in both groups, plasma triglycerides (163.1 versus 151.3 mg/dL, $p<0.05$), low density lipoproteins (LDL) (123.8 versus 117.5 mg/dL, $p<0.05$), erythrocyte sedimentation rate (ESR) (10.6 versus 9.3 mm/h, $p<0.05$), and C-reactive protein (CRP) (2.3 versus 2.0 mg/L, $p<0.05$) values were all higher in the smokers, significantly. On the other hand, high density lipoproteins (HDL) (40.9 versus 44.0 mg/dL, $p<0.05$) and fasting plasma glucose (FPG) (102.3 versus 111.6 mg/dL, $p=0.007$) values and prevalence of diabetes mellitus (8.9% versus 14.3%, $p<0.05$) were all lower in the smokers, significantly. The authors concluded that smoking may cause a low-grade systemic inflammation on vascular endothelium terminating with an accelerated atherosclerotic process-induced end-organ insufficiencies all over the body. Plasma triglycerides, LDL, ESR, and CRP may be positive whereas HDL and FPG may be negative APR indicating such inflammatory effects in the body.

ASSESSING NURSE'S ATTITUDES AND PRACTICE AFTER PARTICIPATING IN A VACCINATION TRAINING PROGRAM: A QUANTITATIVE STUDY

Sadia Munir (1), Jessie Johnson (1), Amber Smith (2), Robyn O'Dwyer (3), Arlene Masaba (1), Khalid Elawad (4), Samya Ahmad (4), Ebtesam Abdulla (3), M.M Al Qudah (4)

(1) Faculty of Nursing University of Calgary Qatar

(2) Program Consultant Primary Health Care

(3) Subject Matter Expert Primary Health Care Corporation

(4) Physician Primary Health Care Corporation

Corresponding author

Sadia Munir MSc, M.Phil, PhD,

Faculty of Nursing

University of Calgary Qatar

Email: munirs@ucalgary.ca

Received: May 2022; Accepted: June 2022; Published: July 2022

Citation: Sadia Munir et al. Assessing Nurse's Attitudes and Practice After participating in a Vaccination Training Program: A Quantitative Study. Middle East Journal of Nursing 2022; 16(2): 3-15 DOI: 10.5742/MEJN2021.9378022

Abstract

Background: Primary healthcare nurses are pivotal to the successful uptake of immunization worldwide. Central to this, is the attitude and practice nurses may have toward vaccines during administration. It is postulated that altering knowledge towards immunization may impact both attitude and practice towards successful immunization uptake. The aim of this research was to assess nurses' knowledge, attitude and practice after the delivery of a three-day continuing professional development program regarding administration, safe handling and delivery of vaccines.

Method: This research consisted of a quantitative cross-sectional study, utilizing a self-administered survey. The survey contained questions related to immunization knowledge, attitude, and practice. Before and after attendance of an immunization program for continuing professional development, the survey was administered to nurses working in well-baby clinics, communicable diseases clinics, travel clinics and school nurses. Specific areas identified gaps in knowledge, attitude, and practice among participating nurses.

Results: Results from our study suggest that attitudes and practices of participants identified a significant difference after receiving an immunization educational program that focused on administration and delivery of immunization skills.

Conclusion: Continuous professional development activities such as this have shown a marked increase in the attitude and practices of nurses making it tantamount to the success of vaccine uptake.

Implications for Practice: Nurses are poised to be frontline advocates for the uptake of immunization; therefore education and training needs to be provided in order for them to understand and further affect change.

Keywords: Vaccine, Immunization, Knowledge, Attitude, Practice

Introduction

It is widely known that vaccines are the most cost-effective method of controlling communicable diseases worldwide (Squeri et al., 2017; World Health Organization [WHO], 2017). Primary healthcare nurses play a vital role in both educating and protecting the public from communicable diseases. These nurses are ubiquitous to and inextricably linked to providing knowledge to parents and adults requiring immunization. According to Lee et al. (2019), there has been a shift towards parents refusing to vaccinate their children, which has led to the re-emergence of communicable diseases. There has been a dearth of evidence to suggest nurses may be linked to the non-compliance amongst parents in the vaccination of their children (Pulcini et al., 2014; Walsh et al., 2015). This in part may be due to lack of knowledge, which affects attitude and practice skills related to immunization.

Primary healthcare nurses are the gatekeepers to protecting the public from the re-emergence of communicable diseases and as such, education within curricula falls short when it comes to lectures on public health and vaccination hesitancy and compliance. Nursing students receive as little as one hour or as much as 52 hours in total on vaccination training within their respective programs (Pelly et al., 2010). Also concerning is the growing public movement in questioning the risks and benefits, side effects, and contraindications for immunization, resulting in more and more adults hesitant to vaccinate themselves or their children (Pelly et al., 2010). A study in Canada found that nurses did not feel equipped to answer immunization concerns of parents and therefore believed further education be provided to help them answer childhood immunization questions (Mossey et al., 2020). Consequently, receiving little immunization education would appear to make it difficult for PHCC nurses to fully support the usefulness of vaccines and safely handle vaccine delivery and services, positioning them at a disadvantage from their perceived knowledge deficits, varied vaccine practices, and potential differing attitudes. In Qatar, the goal was to educate nurses in the realm of immunization as a continuing professional development program. In a concerted effort between Qatar University-School of Pharmacy, Weill Cornell School of Medicine and University of Calgary in Qatar-School of Nursing, this program was developed. This provided an opportunity to assess the knowledge, attitude and practices of nurses before and after the continuing professional development program.

Methods

1. Design: The authors conducted a quantitative cross-sectional study between October and December, 2018 using a self-administered questionnaire. Potential candidates were selected based on the inclusion criteria created by the Primary Health Care Corporation (PHCC) Workforce Training Department. The inclusion criteria included: 1) ability to read and write in English, 2) completed education with a diploma in nursing or Bachelor

of Science in nursing, 3) designated work in Well-Baby Clinics (WBCs), Communicable Diseases Clinics (CDCs), Travel Clinics or Schools, 4) employed for a minimum of 3 years within PHCC, 5) licensed by Qatar Council Health Professionals, and 6) recommended by their manager. This resulted in 340 candidates meeting the inclusion criteria. As a method to calculate sufficient sample size, an online tool (<http://www.nss.gov.au> cited on May, 23rd, 2019) determined 120 participants demonstrated an adequate sample. With this recommendation, two cohorts of 64 and 56 participants were formed, respectively.

2. Questionnaire: A 32-question survey was developed from three pre-existing, validated and tested surveys related to the knowledge, attitude and practice (Lee et al., 2020; Pelly et al., 2010; Ritvo et al., 2003). A team of three health care providers compiled select items based on the diverse representation of nurses and cultural context of Qatar. After review and approval by an expert committee of health care providers, the final survey consisted of three sections: 1) demographic, 2) knowledge, and 3) attitude and practice. Each section amounted to 13, 9, and 20 items respectively.

3. Data Collection: To collect responses of this survey, the Qualtrics online program was used. Emails distributed the survey to participants of cohort 1 and cohort 2 one week prior to the vaccine education program. In this email, the authors asked for informed consent prior to participation and a 7-day turnaround to complete. Within this week, a follow-up email reminded participants about completing the online survey. After receiving vaccine education, practicing and demonstrating their skills, the same vaccine questionnaire was sent to each participant.

4. Data Analysis: The SPSS software version 25 (IBM SPSS statistics, Armonk, NY) and Microsoft Excel performed the data analysis for this study. Application of descriptive statistics calculated the mean and percentages of demographic data and attitude of nurses. The inferential statistic compared the attitude of each participant pre- and post-immunization educational training. The Wilcoxon Signed-rank test computed the effect of immunization training on immunization practices and attitude of nurses. We have recently assessed the immunization knowledge of nurses (Abdullah E et al. 2020). To understand the relationship between knowledge and attitude of nurses, the measure of correlation analysis was carried out to reveal specific items and their association to nurses' knowledge about immunization.

5. Ethical Considerations: Authors of this study obtained ethics approval from PHCC review ethics board.

Results

1. Demographics of Participants

A total of 120 participants (64 cohort 1, 56 cohort 2) submitted the complete surveys which were included in the data analysis. Responses to demographic characteristics are shown in Table 1. Of the participants, 90.9% cohort 1 and 92.9% cohort 2 identified as female between the age of 25-33 years (60.6% cohort 1, 49.1% cohort 2). Most participants identified as staff nurses (87.9% and 96.5%, cohort 1 and cohort 2 respectively) and over half the sample responded to work less than 5 years at PHCC (63% cohort 1 and 56.1% cohort 2). Of the nurses, many completed education at the bachelor's level (81.8% cohort 1, 82.45% cohort 2), while some graduated from nursing school less than 10 years ago (47% cohort 1, 42% cohort 2). More than 70% of participants studied entry level nursing in the Philippines or India. Nurses who graduated from nursing school in the Philippines represented 26 and 29 participants of cohort 1 and cohort 2 respectively. Likewise, participants who graduated from nursing school in India represented 24 and 15 nurses of cohort 1 and 2, respectively. The majority of participants worked in well-baby clinics and described vaccine administration as part of their job description (90% and 98.2%, cohort 1 and 2, respectively). Thirty-two participants of cohort 1 had less than 5 years of vaccination experience whereas 27 participants of group 2 had 6-10 years of vaccination experience. More than 30% of each cohort administered 51-100 doses of vaccines per month and the majority of participants provided immunization services to infants and young children (89.4% cohort 1, 93% cohort 2).

2. Attitude of Participants

Towards Immunization Practices: The majority of nurses strongly disagreed with the general statements: (1) 'It is not necessary to immunize breastfed infants at 2 months of age' (63% cohort 1, 78.6% cohort 2), (2) 'Vaccines may cause chronic diseases and learning disorders because they contain small amounts of mercury' (43.5% cohort 1, 82.1% cohort 2), (3) 'It is no longer necessary to immunize against polio as it is now a rare disease' (65.1% cohort 1, 85.7% cohort 2). Interestingly, variation in responses to particular statements was observed between cohorts. Participants of cohort 2, 85.7 % strongly agreed to the statement 'Getting my annual influenza vaccine is important' whereas only 59.7% of participants of cohort 1 responded to this same statement. Similarly, the statement, 'The vaccines available are very carefully and consistently tested for safety', 80.4% nurses strongly agreed, whereas only 51.6% nurses of cohort 1 strongly agreed. About 23-30% of participants responded neutral to the following three statements: 'The idea of taking a newly developed vaccine, even if it is carefully safety tested, makes me anxious', 'An increasing number of people become anti-vaccine oriented as more information about vaccines and how they are developed is delivered over the Internet', 'Those people who are against taking vaccines are highly prejudiced and ill-informed, scientifically'.

After completion of the continuous professional development program, a significant difference resulted from specific responses on attitudes toward practice of immunization. These differences are shown in Table 2. In both cohorts, significant differences in attitudes were observed from the following statements: 3, 4, 5, 6, 12, 16, and 17. Responses to statements 1, 2 and 18 resulted in significant differences for only cohort 1, whereas only cohort 2 demonstrated a significant difference for statement 7, 13, and 20. (Table 1)

Correlation between the Attitude of Nurses and Immunization Knowledge

We have previously reported that participants of cohort 1 scored high on mean knowledge outcomes compared to cohort 2 (Abdullah et al. 2020). Our results demonstrated that those participants with high mean knowledge scores showed positive attitudes towards three vaccine safety related questions: 'A vaccine can give you a serious case of the very same disease you are trying to avoid', 'An increasing number of people are becoming anti-vaccine oriented as more information about vaccines and how they are developed is (delivered) over the Internet' and 'The idea of taking a newly developed vaccine, even if it is carefully safety tested, makes me anxious' (Table 3). Among cohort 1, 9 of the total 20 attitude questions and the total mean knowledge score of the participants resulted in a significant correlation. However, cohort 2 demonstrated significant correlation between one of the attitudes questions about vaccines (i.e., 'A vaccine can give you a serious case of the very same disease you are trying to avoid') and the total mean knowledge score of the participants. (Table 2)

Table 1: Demographic characteristics of the participants

| | Cohort One | | Cohort Two | |
|--|------------|------|------------|--------|
| | N | % | N | % |
| Gender | | | | |
| Male | 4 | 6.1 | 3 | 5.26 |
| Female | 60 | 90.9 | 53 | 92.9 |
| Missing | 2 | 3 | 1 | 1.8 |
| Age | | | | |
| 25-33 Years | 40 | 60.6 | 28 | 49.1 |
| 34-44 Years | 21 | 31.8 | 22 | 38.59 |
| 45-54 Years | 3 | 4.5 | 6 | 10.5 |
| Missing | 2 | 3 | 1 | 1.8 |
| Duration of Work at PHCC | | | | |
| Less Than One Year | 1 | 1.5 | 1 | 1.75 |
| 1-5 Years | 42 | 63.6 | 32 | 56.1 |
| 6-10 Years | 7 | 10.6 | 11 | 19.29 |
| 11-15 Years | 12 | 18.2 | 9 | 15.78 |
| 16- 20 Years | 2 | 3 | 4 | 7.0 |
| Missing | 2 | 3 | | |
| Professional Classification | | | | |
| Staff Nurse | 58 | 87.9 | 55 | 96.5 |
| School Nurse | 4 | 6.1 | 2 | 3.5 |
| Home Healthcare | 2 | 3 | | |
| Missing | 2 | 3 | | |
| Highest Level of Education | | | | |
| Diploma Level | 5 | 7.6 | 4 | 7.0 |
| Bachelors Level | 54 | 81.8 | 47 | 82.45 |
| Masters Level | 4 | 6.1 | 4 | 7.0 |
| Fundamental License | 1 | 1.5 | 1 | 1.75 |
| Missing | 2 | 3 | | |
| Years Since Graduated From Nursing School | | | | |
| Less Than 5 Years | 4 | 6.1 | 3 | 5.26 |
| 5-10 Years | 31 | 47 | 24 | 42.105 |
| 11-15 Years | 16 | 24.2 | 17 | 29.8 |
| 16-20 Years | 9 | 13.6 | 6 | 10.5 |
| Over 20 Years | 4 | 6.1 | 6 | 10.5 |
| Missing | 2 | 3 | | |
| Years Worked as Practicing Nurse | | | | |
| 1-5 Years | 1 | 1.5 | 1 | 1.75 |
| 6-10 Years | 37 | 56.1 | 27 | 47.36 |
| 11-15 Years | 14 | 21.2 | 16 | 28.07 |
| 16- 20 Years | 8 | 12.1 | 7 | 12.28 |
| Over 21 Years | 4 | 6.1 | 6 | 10.5 |
| Missing | 2 | 3 | | |
| Country of Origin of First Education as a Nurse | | | | |
| Egypt | 5 | 7.6 | 2 | 3.5 |
| India | 24 | 36.4 | 15 | 26.3 |
| Philippines | 26 | 39.4 | 29 | 50.87 |

Table 1: Demographic characteristics of the participants (continued)

| | | | | |
|--|----|------|----|--------|
| Qatar | 4 | 6.1 | 2 | 3.5 |
| Jordan | 3 | 4.5 | 5 | 3.5 |
| Tunis | 2 | 3 | 4 | 1.75 |
| Missing | 2 | 3 | | |
| Locality of Work Place | | | | |
| School Health | 4 | 6.1 | 6 | 10.5 |
| CDC Travel Clinic | 1 | 1.5 | 3 | 5.26 |
| Well-Baby Clinic | 26 | 39.4 | 26 | 45.6 |
| Home Health Clinic | 3 | 4.5 | | |
| Rotating | 15 | 22.7 | | |
| General | 3 | 4.5 | | |
| PHC | 1 | 1.5 | | |
| Family Medicine | 2 | 3 | | |
| Staff Nurse | 1 | 1.5 | | |
| Vaccination Room | 2 | 3 | | |
| Treatment Room | 2 | 3 | | |
| Vaccination Unit / CDC Travel Clinic | 1 | 1.5 | | |
| Walk in Area | 1 | 1.5 | | |
| Well Baby Clinic and Other Areas | 1 | 1.5 | | |
| Missing | 2 | 3 | | |
| Other | | | 22 | 38.5 |
| Giving Vaccination is Part of Job Description | | | | |
| Yes | 60 | 90.9 | 56 | 98.2 |
| No | 1 | 1.5 | 1 | 1.8 |
| Not Sure | 2 | 3 | | |
| Missing | 3 | 4.5 | | |
| Years of Vaccination Experience | | | | |
| Less Than One Year | 3 | 4.5 | | |
| 1-5 Years | 32 | 48.5 | | |
| 6-10 Years | 16 | 24.2 | 27 | 47.368 |
| 11-15 Years | 11 | 16.7 | 16 | 28.07 |
| 16-20 Years | 1 | 1.5 | 7 | 12.28 |
| Over 21 Years | | | 6 | 10.5 |
| Missing | 3 | 4.5 | | |
| Vaccine Doses per Month | | | | |
| None | 3 | 4.5 | 3 | 5.26 |
| Less Than 25 Doses | 9 | 13.6 | 4 | 7.017 |
| 26-50 Doses | 15 | 22.7 | 13 | 22.8 |
| 51-100 Doses | 20 | 30.3 | 19 | 33.3 |
| More Than 101 Doses | 15 | 22.7 | 18 | 31.57 |
| Missing | 4 | 6.1 | | |
| Age Group Vaccinated | | | | |
| Infant and Young Children (0-5 Years) | 59 | 89.4 | 53 | 93 |
| Children and Teenagers (6-17 Years) | 22 | 33.3 | 36 | 63.15 |
| Adults (18 Years and Older) | 26 | 39.4 | 34 | 59.6 |

Table 2: Comparison of the attitude of nurses towards immunization before and after training

| SA | | | | A | | | | | | N | | | | | | DA | | | | | | SDA | | | | | |
|-----|----|-----|------|------|------|----|------|----|------|----|------|-----|------|------|------|----|------|----|------|----|------|---------------------|-------|---|---------|--|--|
| | | Pre | | Post | % | n | Pre | | Post | % | n | Pre | | Post | % | n | Pre | | Post | % | n | Post | | Z | P-value | | |
| Q1 | G1 | 3 | 4.8 | 0 | 0 | 3 | 4.8 | 0 | 0 | 0 | 0 | 1 | 1.5 | 17 | 27 | 61 | 92.4 | 40 | 63 | 4 | 6.1 | -2.748 ^b | 0.006 | | | | |
| | G2 | 8 | 14.3 | 3 | 5.4 | 1 | 1.8 | 6 | 10.7 | 0 | 0 | 1 | 1.8 | 3 | 5.4 | 10 | 17.9 | 44 | 78.6 | 35 | 62.5 | -1.171 ^b | 0.864 | | | | |
| Q2 | G1 | 7 | 11.1 | 3 | 7.1 | 11 | 17.5 | 2 | 4.8 | 3 | 4.8 | 0 | 0 | 30 | 47.6 | 7 | 16.7 | 12 | 19 | 30 | 71.4 | -2.886 ^c | 0.004 | | | | |
| | G2 | 10 | 17.9 | 5 | 8.9 | 4 | 7.1 | 9 | 16.1 | 3 | 5.4 | 3 | 5.4 | 10 | 17.9 | 27 | 48.2 | 29 | 51.8 | 12 | 21.4 | -7.706 ^b | 0.480 | | | | |
| Q3 | G1 | 1 | 1.6 | 7 | 17.1 | 1 | 1.6 | 8 | 19.5 | 3 | 4.8 | 0 | 0 | 28 | 40.6 | 9 | 22 | 30 | 43.5 | 17 | 41.5 | -2.253 ^b | 0.024 | | | | |
| | G2 | 0 | 0 | 1 | 1.8 | 0 | 0 | 2 | 3.6 | 0 | 0 | 11 | 19.6 | 10 | 17.9 | 23 | 41.1 | 46 | 82.1 | 18 | 32.1 | -4.826 ^b | 0.000 | | | | |
| Q4 | G1 | 0 | 0 | 1 | 2.4 | 1 | 1.6 | 0 | 0 | 0 | 0 | 0 | 0 | 21 | 33.3 | 7 | 10.1 | 41 | 65.1 | 33 | 80.5 | -1.856 ^c | 0.063 | | | | |
| | G2 | 0 | 0 | 0 | 0 | 1 | 1.8 | 1 | 1.8 | 0 | 0 | 1 | 1.8 | 7 | 12.5 | 20 | 35.7 | 48 | 85.7 | 33 | 58.9 | -2.499 ^b | 0.012 | | | | |
| Q5 | G1 | 36 | 57.1 | 1 | 2.4 | 21 | 33.3 | 0 | 0 | 5 | 7.9 | 0 | 0 | 1 | 1.6 | 8 | 19.5 | 0 | 0 | 32 | 78 | -5.437 ^c | 0.000 | | | | |
| | G2 | 48 | 85.7 | 33 | 58.9 | 6 | 10.7 | 21 | 37.5 | 0 | 0 | 1 | 1.8 | 0 | 0 | 0 | 0 | 1 | 1.8 | 1 | 1.8 | -2.702 ^c | 0.007 | | | | |
| Q6 | G1 | 21 | 30.4 | 23 | 54.8 | 33 | 52.4 | 14 | 33.3 | 4 | 6.3 | 3 | 7.1 | 4 | 6.3 | 2 | 4.5 | 1 | 1.5 | 0 | 0 | -2.945 ^b | 0.003 | | | | |
| | G2 | 39 | 69.6 | 19 | 33.9 | 14 | 25 | 26 | 46.4 | 0 | 0 | 5 | 8.9 | 0 | 0 | 6 | 10.7 | 3 | 5.4 | 0 | 0 | -3.046 ^c | 0.002 | | | | |
| Q7 | G1 | 37 | 59.7 | 30 | 73.2 | 21 | 33.9 | 9 | 22 | 1 | 1.6 | 1 | 2.4 | 3 | 4.8 | 0 | 0 | 0 | 0 | 1 | 2.4 | -0.096 ^b | 0.924 | | | | |
| | G2 | 44 | 78.6 | 28 | 50 | 8 | 14.3 | 20 | 35.7 | 0 | 0 | 2 | 3.6 | 0 | 0 | 2 | 3.6 | 4 | 7.1 | 4 | 7.1 | -2.032 ^c | 0.042 | | | | |
| Q8 | G1 | 38 | 61.3 | 23 | 54.8 | 21 | 33.9 | 14 | 33.3 | 2 | 3.2 | 3 | 7.1 | 0 | 0 | 2 | 2.9 | 1 | 1.6 | 0 | 0 | -1.013 ^b | 0.311 | | | | |
| | G2 | 46 | 82.1 | 35 | 62.5 | 7 | 12.5 | 18 | 32.1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 5.4 | 2 | 3.6 | -1.227 ^c | 0.220 | | | | |
| Q9 | G1 | 23 | 36.5 | 34 | 81 | 35 | 56.6 | 8 | 19 | 3 | 4.8 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 3.2 | 0 | 0 | -4.216 ^b | 0.000 | | | | |
| | G2 | 34 | 60.7 | 27 | 48.2 | 17 | 30.4 | 25 | 44.6 | 2 | 3.6 | 3 | 5.4 | 1 | 1.8 | 1 | 1.8 | 1 | 1.8 | 0 | 0 | -7.745 ^c | 0.456 | | | | |
| Q10 | G1 | 11 | 17.5 | 24 | 60 | 30 | 11.1 | 14 | 35 | 7 | 6.3 | 1 | 2.5 | 4 | 47.6 | 1 | 2.5 | 11 | 17.5 | 0 | 0 | -3.631 ^b | 0.000 | | | | |
| | G2 | 18 | 32.1 | 8 | 14.3 | 14 | 25 | 25 | 44.6 | 7 | 12.5 | 8 | 14.3 | 7 | 12.5 | 13 | 23.2 | 10 | 17.9 | 2 | 3.6 | -1.149 ^b | 0.882 | | | | |
| Q11 | G1 | 6 | 9.7 | 8 | 19.5 | 16 | 25.8 | 13 | 31.7 | 12 | 19.4 | 5 | 12.2 | 18 | 29 | 6 | 14.6 | 10 | 16.1 | 9 | 22 | -1.392 ^b | 0.164 | | | | |
| | G2 | 17 | 30.4 | 5 | 8.9 | 13 | 23.2 | 23 | 41.1 | 6 | 10.7 | 11 | 19.6 | 9 | 16.1 | 12 | 21.4 | 11 | 19.6 | 5 | 8.9 | -3.54 ^c | 0.724 | | | | |

Table 2: Comparison of the attitude of nurses towards immunization before and after training (continued)

| | | | | | | | | | | | | | | | | | | | | | | | |
|-----|----|----|------|----|------|----|------|----|------|----|------|----|------|----|------|----|------|----|------|----|------|---------------------|-------|
| Q12 | G1 | 15 | 23.8 | 7 | 17.5 | 32 | 50.8 | 8 | 20 | 11 | 17.5 | 5 | 12.5 | 3 | 4.8 | 13 | 32.5 | 2 | 3.2 | 7 | 17.5 | -2.315 ^e | 0.021 |
| | G2 | 30 | 53.6 | 17 | 30.4 | 18 | 32.1 | 26 | 46.4 | 4 | 7.1 | 8 | 14.3 | 1 | 1.8 | 5 | 8.9 | 2 | 3.6 | 0 | 0 | -2.110 ^e | 0.035 |
| Q13 | G1 | 19 | 30.2 | 18 | 45 | 34 | 54 | 18 | 45 | 8 | 12.7 | 2 | 5 | 0 | 0 | 2 | 5 | 2 | 3.2 | 0 | 0 | -1.791 ^b | 0.073 |
| | G2 | 40 | 71.4 | 19 | 33.9 | 13 | 23.2 | 28 | 50 | 1 | 1.8 | 7 | 12.5 | 0 | 0 | 2 | 3.6 | 2 | 3.6 | 0 | 0 | -3.124 ^e | 0.002 |
| Q16 | G1 | 0 | 0 | 11 | 27.5 | 7 | 11.1 | 12 | 30 | 11 | 17.5 | 2 | 5 | 19 | 30.2 | 9 | 22.5 | 26 | 41.3 | 6 | 15 | -3.776 ^b | 0.000 |
| | G2 | 1 | 1.8 | 3 | 5.4 | 3 | 5.4 | 16 | 28.6 | 3 | 5.4 | 5 | 8.9 | 17 | 30.4 | 18 | 32.1 | 32 | 57.1 | 14 | 25 | -4.173 ^b | 0.000 |
| Q17 | G1 | 2 | 3.2 | 2 | 5 | 16 | 25.8 | 4 | 10 | 17 | 27.4 | 2 | 5 | 19 | 30.6 | 12 | 30 | 8 | 12.9 | 20 | 50 | -2.704 ^e | 0.007 |
| | G2 | 1 | 1.8 | 4 | 7.1 | 7 | 12.5 | 16 | 28.6 | 16 | 28.6 | 16 | 28.6 | 14 | 25 | 16 | 28.6 | 18 | 32.1 | 4 | 7.1 | -3.029 ^b | 0.002 |
| Q18 | G1 | 4 | 6.8 | 2 | 5 | 28 | 47.5 | 6 | 15 | 14 | 23.7 | 5 | 12.5 | 10 | 16.9 | 19 | 47.5 | 3 | 5.1 | 8 | 20 | -2.934 ^e | 0.003 |
| | G2 | 9 | 16.1 | 5 | 8.9 | 16 | 28.6 | 21 | 37.5 | 15 | 26.8 | 21 | 37.5 | 9 | 16.1 | 7 | 12.5 | 7 | 12.5 | 2 | 3.6 | -7.59 ^b | 0.448 |
| Q19 | G1 | 13 | 18.8 | 9 | 22.5 | 19 | 27.5 | 18 | 45 | 19 | 27.5 | 7 | 17.5 | 11 | 15.9 | 3 | 7.5 | 1 | 1.4 | 3 | 7.5 | -1.330 ^b | 0.184 |
| | G2 | 18 | 32.1 | 9 | 16.1 | 23 | 41.1 | 24 | 42.9 | 9 | 16.1 | 14 | 25 | 2 | 3.6 | 6 | 10.7 | 4 | 7.1 | 3 | 5.4 | -1.811 ^e | 0.070 |
| Q20 | G1 | 27 | 39.1 | 12 | 30.8 | 22 | 31.9 | 12 | 30.8 | 10 | 14.5 | 11 | 28.2 | 2 | 2.9 | 3 | 7.7 | 2 | 2.9 | 1 | 2.6 | -9.68 ^e | 0.333 |
| | G2 | 34 | 60.7 | 21 | 37.5 | 13 | 23.2 | 21 | 37.5 | 4 | 7.1 | 3 | 5.4 | 2 | 3.6 | 9 | 16.1 | 3 | 5.4 | 1 | 1.8 | -1.962 ^e | 0.050 |

Table 3: Correlation between the mean knowledge score and attitude of nurses towards immunization

| | Group 1 | | | Group 2 | | |
|--|---------|---------------------|---------|---------|---------------------|---------|
| | mean | Pearson correlation | p value | mean | Pearson correlation | p value |
| It is not necessary to immunize breastfed infants at 2 months of age | | | | | | |
| Strongly agree | 4.3 | -0.104079 | 0.4208 | 1.33 | -0.207 | 0.129 |
| Agree | 5.34 | | | 3 | | |
| Neutral | 0 | | | 3 | | |
| Disagree | 5.06 | | | 2.5 | | |
| Strongly disagree | 5.4 | | | 3.142 | | |
| It is necessary to restart a series of vaccines if a dose is missed or delayed | | | | | | |
| Strongly agree | 4.7148 | -0.124045 | 0.3367 | 2.8 | 0.118 | 0.388 |
| Agree | 4.727 | | | 3.667 | | |
| Neutral | 3.33 | | | 2.66 | | |
| Disagree | 6.103 | | | 2.74 | | |
| Strongly disagree | 4.5 | | | 2.883 | | |
| Vaccines may cause chronic diseases and learning disorders because they contain small amounts of mercury | | | | | | |
| Strongly agree | 5 | -0.201334 | 0.1166 | 0 | 0.079 | 0.565 |
| Agree | 3 | | | 5 | | |
| Neutral | 5 | | | 3.27 | | |
| Disagree | 4.892 | | | 2.78 | | |
| Strongly disagree | 5.7 | | | 2.77 | | |
| It is no longer necessary to immunize against polio as it is now a rare disease | | | | | | |
| Strongly agree | 0 | -0.0977660 | 0.4496 | 0 | 0.074 | 0.592 |
| Agree | 3 | | | 2 | | |
| Neutral | 0 | | | 4 | | |
| Disagree | 5.25 | | | 3.15 | | |
| Strongly disagree | 5.317 | | | 2.7897 | | |
| Getting my annual influenza vaccine is important | | | | | | |
| Strongly agree | 5.25 | .261* | 0.0401 | 0 | -0.193 | 0.154 |
| Agree | 4.38 | | | 2.845 | | |
| Neutral | 5.25 | | | 2.857 | | |
| Disagree | 4 | | | 3 | | |
| Strongly disagree | 0 | | | 6 | | |
| Getting tetanus/diphtheria toxoid (Td) vaccine (every 10 years) is important | | | | | | |
| Strongly agree | 6.38 | .313* | 0.0133 | 2.84 | -0.075 | 0.581 |
| Agree | 4.78 | | | 2.88 | | |
| Neutral | 3.25 | | | 0 | | |
| Disagree | 5.7 | | | 2.8 | | |
| Strongly disagree | 3 | | | 3.33 | | |
| Children should be offered varicella vaccine (chicken pox) at 12 months of age | | | | | | |
| Strongly agree | 5.38 | .338** | 0.0076 | 3 | 0.062 | 0.649 |
| Agree | 4.6 | | | 2.7 | | |
| Neutral | 4 | | | 5 | | |
| Disagree | 3.66 | | | 3 | | |
| Strongly disagree | 0 | | | 2.25 | | |

Table 3: Correlation between the mean knowledge score and attitude of nurses towards immunization (continued)

| | | | | | | |
|--|-------|------------|--------|-------|--------|-------|
| It is important to encourage all healthcare workers to be immunized annually with influenza vaccine | | | | | | |
| Strongly agree | 5.65 | .267* | 0.0372 | 2.88 | -0.159 | 0.245 |
| Agree | 4.76 | | | 2.83 | | |
| Neutral | 4 | | | 0 | | |
| Disagree | 0 | | | 0 | | |
| Strongly disagree | 3 | | | 4.5 | | |
| It is important to ensure that your adult patients have received all their required adult vaccines | | | | | | |
| Strongly agree | 5.86 | .263* | 0.0386 | 3 | 0.053 | 0.699 |
| Agree | 4.9 | | | 2.7 | | |
| Neutral | 5.66 | | | 4 | | |
| Disagree | 0 | | | 1 | | |
| Strongly disagree | 3 | | | 0 | | |
| Routine immunization should be delayed in individuals with moderate to severe illness with or without fever | | | | | | |
| Strongly agree | 4.36 | -.424** | 0.0005 | 2.875 | -0.075 | 0.584 |
| Agree | 4.86 | | | 2.68 | | |
| Neutral | 5 | | | 3.5 | | |
| Disagree | 5.85 | | | 3.07 | | |
| Strongly disagree | 6.9 | | | 2.5 | | |
| Parental stress can be reduced by spreading necessary vaccines over several visits | | | | | | |
| Strongly agree | 6.83 | -0.1504640 | 0.2470 | 3 | 0.073 | 0.591 |
| Agree | 4.66 | | | 3.13 | | |
| Neutral | 3.66 | | | 2.27 | | |
| Disagree | 5.72 | | | 2.4 | | |
| Strongly disagree | 6.5 | | | 3.4 | | |
| I received adequate teaching about vaccines during my nursing training | | | | | | |
| Strongly agree | 6.2 | .414** | 0.0008 | 3 | -0.68 | 0.619 |
| Agree | 5.31 | | | 2.69 | | |
| Neutral | 4.9 | | | 3.12 | | |
| disagree | 3 | | | 3.4 | | |
| Strongly disagree | 2.5 | | | 0 | | |
| I am comfortable responding to questions parents/patients have about vaccine side effects | | | | | | |
| Strongly agree | 6.684 | .498** | 3.8 | 3.057 | 0.105 | 0.444 |
| Agree | 4.85 | | | 2.92 | | |
| Neutral | 4.14 | | | 2.57 | | |
| Disagree | 0 | | | 2.5 | | |
| Strongly disagree | 2.5 | | | 0 | | |
| The vaccines available are very carefully and consistently tested for safety | | | | | | |
| Strongly agree | 5.53 | 0.2408741 | 0.0614 | 2.97 | 0.024 | 0.862 |
| Agree | 5.23 | | | 2.75 | | |
| Neutral | 3 | | | 4 | | |
| Disagree | 0 | | | 0 | | |
| Strongly disagree | 3 | | | 0 | | |

Table 3: Correlation between the mean knowledge score and attitude of nurses towards immunization (continued)

| | | | | | | |
|--|-------|------------|--------|-------|---------|-------|
| A vaccine is a medical treatment in which dangerous viruses and bacteria are killed or modified and then put in your body | | | | | | |
| Strongly agree | 5.4 | -0.1011243 | 0.4341 | 3 | 0.163 | 0.229 |
| Agree | 5.03 | | | 2.96 | | |
| Neutral | 0 | | | 3.86 | | |
| Disagree | 5.33 | | | 2.33 | | |
| Strongly disagree | 6.5 | | | 2 | | |
| A vaccine can give you a serious case of the very same disease you are trying to avoid | | | | | | |
| Strongly agree | 4.85 | -.347** | 0.0057 | 3.66 | 0.438** | 0.001 |
| Agree | 3.9 | | | 3.875 | | |
| Neutral | 3.9 | | | 3.2 | | |
| Disagree | 4.84 | | | 2.277 | | |
| Strongly disagree | 6.19 | | | 2.357 | | |
| The idea of taking a newly developed vaccine, even if it is carefully safety tested, makes me anxious | | | | | | |
| Strongly agree | 3.5 | -.388** | 0.0020 | 4.5 | 0.157 | 0.248 |
| Agree | 4.37 | | | 2.75 | | |
| Neutral | 5.37 | | | 2.812 | | |
| Disagree | 5.26 | | | 2.875 | | |
| Strongly disagree | 7.12 | | | 2.5 | | |
| An increasing number of people are become anti-vaccine oriented as more information about vaccines and how they are developed is over the Internet | | | | | | |
| Strongly agree | 9 | -0.0722900 | 0.5897 | 3.6 | 0.101 | 0.941 |
| Agree | 4.67 | | | 2.619 | | |
| Neutral | 4.38 | | | 3.142 | | |
| Disagree | 6.5 | | | 2.285 | | |
| Strongly disagree | 6.66 | | | 4 | | |
| Those people who are against taking vaccines are highly prejudiced and ill-informed, scientifically. | | | | | | |
| Strongly agree | 6.615 | 0.18929452 | 0.1406 | 3.333 | 0.019 | 0.889 |
| Agree | 5.105 | | | 2.703 | | |
| Neutral | 0 | | | 2.92 | | |
| Disagree | 4.16 | | | 3 | | |
| Strongly disagree | 8 | | | 3 | | |
| If it were available, I would readily take a vaccine to prevent HIV-AIDS | | | | | | |
| Strongly agree | 5.62 | 0.097 | 0.451 | 2.66 | -0.111 | 0.42 |
| Agree | 5.04 | | | 3.047 | | |
| Neutral | 4.44 | | | 3 | | |
| Disagree | 5.5 | | | 3 | | |
| Strongly disagree | 6 | | | 4 | | |

Discussion

To our knowledge, this is the first survey in Qatar to evaluate knowledge, attitude, and practice of registered nurses participating before and after a CPD immunization program in the primary care setting. In this study, a very high participation rate (99.17%) was achieved, demonstrating a representative sample. Demographic data also supports a representative sample, as many participants reported administration of vaccine as part of their job description at PHCC- the main provider for all immunization services in Qatar. In addition, the majority of participants worked in well-baby clinics, in an area known for routine practice of early childhood immunization.

In the present study, the majority of nurses strongly disagreed in response to questions about common attitudes related to vaccine safety and efficacy before the CPD vaccine education program. The most common false understandings found were the following: (1) 'It is not necessary to immunize breastfed infants at 2 months of age', (2) 'It is no longer necessary to immunize against polio as it is now a rare disease' and (3) 'Vaccines may cause chronic diseases and learning disorders because they contain small amounts of mercury'. These results demonstrate a lack of education and a need for practice and knowledge to change personal attitudes about immunization. This is important for program development, as nurses have a central role in communicating about evidence-based reasons for immunization, and any misconceptions and beliefs may contribute to parental decisions to accept or reject immunization (Mergler et al., 2013). In addition, studies clearly document that positive attitudes of health professionals significantly correlate with the higher vaccination coverage rates (Forster et al 2016). Ritvo et al., 2003;). Hence, our program development focused on including role play with familiar and diverse scenarios to represent lived experiences of participants communicating with parents and children in the practice setting.

Furthermore, many studies have shown that many health care providers fail to make significant recommendations about the benefits and risks of vaccines for their clients because of knowledge gaps and lack of consistency in immunization education (Dybsand et al., 2019, Pelly et al., 2010; Kernéis S, et al 2017). In our study, allowing for behavior, communication and attitude practice through guided scenarios, participants could demonstrate proactive behaviors by answering common questions or concerns to better guide parental decision making. According to Shibli et al. (2017) attitudes of pediatric healthcare providers and their recommendations are associated with parents' decisions to vaccinate their children. In a study conducted by Best et al. (2018), knowledge and attitude of school nurses influence parental decision making about immunizing their children. More recently, a multimodal study conducted by Wilson et al. (2019), identified nurses' misbeliefs and misconceptions were the strongest barriers to vaccine uptake. Therefore, nurses at the frontline administering vaccines need to be aware

of their own misbeliefs to change their own attitudes and be proactive. They need to be adequately trained and educated to communicate safety and be aware of vaccine efficacy.

Our results post training and education suggest that participant knowledge, attitudes, and practice related to immunization were significantly different. In other words, the specially designed program had an impact. Wilson et al. (2019) found the underlying cause of these misbeliefs and misconceptions among nurses were from lack of training and confidence in official sources related to information about vaccines. Furthermore, research has shown substantial variation in the knowledge about immunization exists among the health care providers because of the lack of standardization of immunization training within nursing curricula (Berry et al., 2017; Nicol, E. et al 2019). Findings further suggest that inadequate education regarding vaccination is the main cause of discomfort experienced by health care professionals in discussing side effects of immunizations with their patients (Dysband et al. 2019). Moreover, it is indicated that worrisome attitudes and knowledge gaps are a continual challenge for future health care professionals (Berry et al., 2017 & Nicol, et al. 2019).

Public and providers' concerns about potential side effects and their confidence about vaccine efficacy are the contributing factors of non-compliance and lower immunization coverage in adults and children. This suggests that providers should be aware of the misconceptions and be able to communicate with parents and patients to educate them about the benefits and risks of vaccines (Matta et al., 2020 & Jaca, et al., 2018).

Our findings indicate that despite the demographics of all nurses, their background or undergraduate nursing educational programs, there is still continued misunderstanding and confusion about the safety and efficacy of routine childhood vaccines in the health care settings (Picchio et al 2019). Therefore, nurses need extra education and training as it is not offered fully in programs. Participating in this program allowed nurses the opportunity to gain knowledge in theory to be practiced in role play. In this vein we were able to add to nurse's knowledge, dispel myths and further empower them in the realm of vaccine administration. Therefore, there is a need for the development and evaluation of immunization educational programs specifically designed to overcome knowledge gaps and negative attitude of nurses which can be incorporated into formal education curricula of health care professionals to increase the confidence and competency of health care professionals (Pelly et al., 2010). The current education program has proven successful thus far. It is postulated that having carefully designed education programs are an important step in ensuring nurses are kept abreast of new evidence-based immunization knowledge in order to enhance and advance practice and to discuss attitudes they may have toward immunization.

Limitation: There some limitations to note for this study. One limitation is the fact that the combined survey was not psychometrically tested. Also, the focus of this paper is on PHC nurses' attitude and practice, hence it is not enough to assess their knowledge level post this vaccine training and education in comparison to the other studies. Another limitation is distribution of post surveys occurred six weeks after the delivery of the program, which may not account for knowledge retention after many months. It would be reasonable to expect higher scores immediately after program compared to 6 months or longer. Lastly, this paper does not include the qualitative data, which was collected and analyzed by the researchers to round out the findings of this whole study.

Conclusion

The results of this study indicate a strong correlation between the mean scores of attitude and practice responses both before and after the CPD. Thus, this demonstrates the need to provide training programs like these to nurses who work in areas where immunization is a primary part of their practice. A successful uptake of immunization worldwide is inherent on nurses' attitudes and how they practice within this realm; hence it is necessary to provide continuing education. Offering well designed educational programs with the latest evidence to nurses enhances their ability to perform better teaching and administration of immunization to parents / adults.

References

- Abdulla, E., Johnson, J., Munir, S., & O'Dwyer, R. (2020). Assessing primary health care nurses' knowledge toward immunizations: A quantitative study. *Journal of public health research*, 9(4), 1716. <https://doi.org/10.4081/jphr.2020.1716>
- Berry, N.J., Henry A., Danchin, M., Trevena, L.J., Willaby, H.W., & Leask, J. (2017). When parents won't vaccinate their children: A qualitative investigation of Australian primary care providers' experiences. *BMC Pediatrics*, 17(19), 1–10. <https://doi.org/10.1186/s12887-017-0783-2>
- Best, N., Oppewal, S., & Travers, D. (2018). Exploring school nurse interventions and health and education outcomes: An integrative review. *The Journal of School Nursing*, 34, 14–27. <http://doi.org/10.1177/1059840517745359>
- Dybsand, L. L., Hall, K.J., & Carson, P. J. (2019). Immunization attitudes, opinions, and knowledge of healthcare professional students at two midwestern universities in the United States. *BMC Medical Education*, 19(1), 242. <https://doi.org/10.1186/s12909-019-1678-8>
- Forster AS, Rockliffe L, Chorley AJ, et al (2016). A qualitative systematic review of factors influencing parents' vaccination decision-making in the United Kingdom. *Expert Review of Vaccines*.2:603–612 <https://doi.org/10.1016/j.ssmph.2016.07.005>
- Jaca A, Mathebula L, Iweze A, Pienaar E, Wiysonge CS (2018) A systematic review of strategies for reducing missed opportunities for vaccination. *Vaccine* 36(1):2921–2927. <https://doi.org/10.1016/j.vaccine.2018.04.028>
- Jelleyman, T., & Ure, A. (2004). Attitudes to immunization: A survey of health professionals in the Roturua District. *The New Zealand Medical Journal*, 117(1189), U769.
- Kernéis S, Jacquet C, Bannay A, , May, T., Launay, O., Verger, V., Pulcini, C. (2017). Vaccine education of medical students: a nationwide cross-sectional survey. *American Journal of Preventive Medicine*.53:e97-e104. <https://doi.org/10.1016/j.amepre.2017.01.014>
- Lee, C.H.; Sibley, C.G (2020). Attitudes toward vaccinations are becoming more polarized in New Zealand: Findings from a longitudinal survey. *E Clinical Medicine*, 23, 100387. <https://doi.org/10.1016/j.eclinm.2020.100387>
- Lee, J. J., & Prakash Ramdass, M. D. (2019). Measles outbreak 2019: Re-emergence in the United States. *International Public Health Journal*, 11(4), 371–379.
- Matta P, Mouallem RE, Akel M, Hallit S, Khalife M-CF (2020). Parents' knowledge, attitude and practice towards children's vaccination in Lebanon: role of the parent-physician communication. *BMC Public Health*.;20(1):1439. <https://doi.org/10.1186/s12889-020-09526-3>
- Mergler, M.J., Omer, S.B., Pan, W.K., Navar-Boggan, A.M., Orenstein, W., Marcuse, E.K., Taylor, J., DeHart, M.P., Carter, T.C., Damico, A., Halsey, N., & Salmon, D.A. (2013). Association of vaccine-related attitudes and beliefs between parents and health care providers. *Vaccine*, 31(41), 4591–4595. <https://doi.org/10.1016/j.vaccine.2013.07.039>
- Mossey S, Hosman S, Montgomery P, McCauley K. Parents' experiences and nurses' perceptions of decision-making about childhood immunization. *Canadian Journal of Nursing Research* 2020;52(4):255–67. <https://doi.org/10.1177/0844562119847343>
- Nicol, E., Turawa, E., & Bonsu, G. (2019). Pre- and in-service training of health care workers on immunization data management in LMICs: a scoping review. *Human resources for health*, 17(1), 92. <https://doi.org/10.1186/s12960-019-0437-6>
- Pelly, L.P., Pierrynowski MacDougall, D.M., Halperin, B.A., Strang R.A., Bowles, D.M.B., & McNeil, S.A. (2010). THE VAXED PROJECT: An Assessment of Immunization Education in Canadian Health Professional Programs. *BMC Medical Education*, 10, 86. <https://doi.org/10.1186/1472-6920-10-86>
- Picchio, C.A.; Carrasco, M.G. (2019); Sagué-Vilavella, M.; Rius, C. Knowledge, attitudes and beliefs about vaccination in primary healthcare workers involved in the administration of systematic childhood vaccines, Barcelona, 2016/17. *Eurosurveillance* 24, 1800117.
- Pulcini, C., Massin, S., Launay, O., & Verger, P. (2014). Knowledge, attitudes, beliefs and practices of general practitioners towards measles and MMR vaccination in southeastern France in 2012. *Clinical Microbiology and Infection*, 20(1), 38–43. <https://doi.org/10.1111/1469-0691.12194>
- Ritvo, P., Irvine, J., Klar, N., Wilson, K., Brown, L., Brenner, K.E., Rinfret, A., Remis, A., & Krahn, M.D. (2003). A Canadian national survey of attitudes and knowledge regarding vaccines. *Journal of Immunology Based*

Vaccines, 1, 3-5. <https://doi.org/10.1186/1476-8518-1-3>

Shibli, R., Shemer, R., Lerner-Geva, L., & Rishpon, S. (2017). Knowledge and recommendation regarding routine childhood vaccinations among pediatric healthcare providers in Israel. *Vaccine*, 35(4), 633-638. <https://doi.org/10.1016/j.vaccine.2016.12.005>

Squeri, R., Genovese C., Trimarchi, G., Palamara, M., & La Fauci, V.(2017). An evaluation of attitude toward vaccines among healthcare workers of a University Hospital in Southern Italy. *Annali di igiene: Medicina Preventiva e di Comunita*, 29(6), 595-606. <https://doi.org/10.7416/ai.2017.2188>

Vorstters, A., Tack, S., Hendrickx, G., Vladimirova, N., Bonanni, P., Pistol, A., Metlicar, T., Alvares Pasquin, M.J., Mayer, M.A., Aronsson, B., Heijbel, H., & Van Damme, P. (2010). A summer school on vaccinology: Responding to identified gaps in pre-service immunization training of future health care workers. *Vaccine*, 28 (9), 2053-2059. <https://doi.org/10.1016/j.vaccine.2009.12.033>

Walsh, S., Thomas, D. R., Mason, B. W., & Evans, M. R. (2015). The impact of the media on the decision of parents in South Wales to accept measles-mumps-rubella (MMR) immunization. *Epidemiology and Infection*, 143(3), 550-560. <https://doi.org/10.1017/S0950268814000752>

Wilson, R., Scronias, D., Zaytseva, A., Ferry, M.A., Chamboredon, P., Dubé, E., & Verger P. (2019). Seasonal influenza self-vaccination behaviours and attitudes among nurses in Southeastern France. *Human Vaccines and Immunotherapeutics*,15(10), 2423-2433. <https://doi.org/10.1080/21645515.2019.1587274>

Wood, D., Pereyra, M., & Halfon, N. (1995). Increasing immunizations in the public sector: missed opportunities and other contributing factors. *American Journal Public Health*, 85, 850-853. <https://doi.org/10.2105/AJPH.85.6.850>

World Health Organization. (2017). Immunization coverage. Retrieved from <http://www.who.int/mediacentre/factsheets/fs378/en/>Google Scholar

SMOKING CAUSES A LOW-GRADE SYSTEMIC INFLAMMATION IN THE HUMAN BODY

Mehmet Rami Helvaci (1)

Semih Salaz (2)

Engin Altintas (1)

Atilla Yalcin (1)

Abdulrazak Abyad (3)

Lesley Pocock (4)

(1) Specialist of Internal Medicine, MD

(2) Ministry of Health of Turkey, MD

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

(4) Medi-WORLD International

Corresponding Author:

Mehmet Rami Helvaci, M.D.

07400, ALANYA, Turkey

Phone: 00-90-506-4708759

Email: mramihelvaci@hotmail.com

Received: May 2022; Accepted: June 2022; Published: July 2022

Citation: Helvaci M R et al. Smoking causes a low-grade systemic inflammation in human body. Middle East Journal of Nursing 2022; 16(2): 16-22 DOI: 10.5742/MEJN2021.9378023

Abstract

Background: There may be some positive and negative acute phase reactants (APR) indicating the possible inflammatory effects of smoking on vascular endothelium all over the body.

Method: Consecutive daily smokers at least for a period of six months and age and sex-matched non-smokers were taken into the study. Cases with regular alcohol consumption (one drink a day) and patients with inflammatory, infectious, or devastating disorders including eating disorders, malignancies, acute or chronic renal failure, cirrhosis, chronic obstructive pulmonary disease, hyper- or hypothyroidism, or heart failure were excluded.

Results: The study included 150 smokers (99 males) and 162 non-smokers. Interestingly, the mean age of the smokers was 45.9 years, and 66.0% of them were male. Although the mean weight, body mass index, systolic and diastolic blood pressures, and hematocrit values were similar in both groups, triglycerides (163.3 versus 151.8 mg/dL, $p<0.05$), low density lipoproteins (LDL) (126.1 versus 117.4 mg/dL, $p<0.05$), erythrocyte sedimentation

rate (ESR) (10.8 versus 9.4 mm/h, $p<0.05$), and C-reactive protein (CRP) (2.5 versus 2.1 mg/L, $p<0.05$) values were all higher in the smokers, significantly. On the other hand, high density lipoproteins (HDL) (41.1 versus 44.0 mg/dL, $p<0.05$) and fasting plasma glucose (FPG) (101.9 versus 111.9 mg/dL, $p<0.01$) values were lower in the smokers, significantly.

Conclusion: Smoking causes a low-grade systemic inflammation on vascular endothelium terminating with an accelerated atherosclerosis-induced end-organ insufficiencies in the body. Plasma triglycerides, LDL, ESR, and CRP may be positive whereas HDL and FPG negative APR indicating the inflammatory effects of smoking in the human body.

Key words: Smoking, triglycerides, low density lipoproteins, erythrocyte sedimentation rate, C-reactive protein, high density lipoproteins, fasting plasma glucose

Introduction

The endothelium is a monolayer of endothelial cells which constitutes the inner cellular lining of arteries, veins, capillaries, and lymphatics. It may be the major player in the control of blood fluidity, platelets aggregation, and vascular tone. It may be the major actor in immunology, inflammation, and angiogenesis. It may also be important in the endocrinology. The endothelial cells control vascular tone and blood flow by synthesizing and releasing nitric oxide, metabolites of arachidonic acid, and reactive oxygen species. Additionally, they are also important for generation of vasoactive hormones such as angiotensin II. An endothelial dysfunction linked to an imbalance in the synthesis and/or release of these endothelial factors may explain the initiation of several cardiovascular pathologies including hypertension (HT) and atherosclerosis. On the other hand, excess weight, smoking, and alcohol are well-known causes of chronic endothelial inflammation terminating with an accelerated atherosclerosis-induced end-organ insufficiencies in human body (1). Chronic endothelial damage may be the major underlying cause of aging and death by causing end-organ insufficiencies in human being (2). Much higher blood pressures (BP) of the afferent vasculature may be the major accelerating factor by causing recurrent injuries on vascular endothelium. Probably, whole afferent vasculature including capillaries are mainly involved in the process. Therefore the term of venosclerosis is not as famous as atherosclerosis in the literature. Due to the chronic endothelial damage, inflammation, edema, and fibrosis, vascular walls thicken, their lumens narrow, and they lose their elastic natures, those eventually reduce blood supply to the terminal organs, and increase systolic and decrease diastolic BP further. Some of the well-known accelerating factors of the inflammatory process are physical inactivity, animal-rich diet, excess weight, smoking, alcohol, chronic inflammations, prolonged infections, and cancers for the development of terminal consequences including obesity, HT, diabetes mellitus (DM), cirrhosis, peripheral artery disease (PAD), chronic obstructive pulmonary disease (COPD), coronary heart disease (CHD), chronic renal disease (CRD), mesenteric ischemia, osteoporosis, stroke, dementia, other end-organ insufficiencies, early aging, and premature death (3). Although early withdrawal of the accelerating factors can delay terminal consequences, after development of HT, DM, cirrhosis, COPD, CRD, CHD, PAD, mesenteric ischemia, osteoporosis, stroke, dementia, other end-organ insufficiencies, and aging, endothelial changes can not be reversed completely due to their fibrotic natures. The accelerating factors and terminal consequences are researched under the headings of the metabolic syndrome, aging syndrome, or accelerated endothelial damage syndrome, extensively (4, 5). We tried to understand whether or not there are some significant relationships between smoking and some acute phase reactants (APR) in the body.

Material and methods

The study was performed in the Internal Medicine Polyclinic of the Dumlupinar University between August 2005 and March 2007. Consecutive daily smokers at least for a period of six months were taken into the study. Cases with regular alcohol consumption (one drink a day) and patients with inflammatory, infectious, or devastating disorders including eating disorders, malignancies, acute or chronic renal failure, cirrhosis, COPD, hyper- or hypothyroidism, and heart failure were excluded. A routine check up procedure including hemogram, erythrocyte sedimentation rate (ESR), C-reactive protein (CRP), fasting plasma glucose (FPG), triglycerides, low density lipoproteins (LDL), high density lipoproteins (HDL), albumin, creatinine, thyroid function tests, hepatic function tests, markers of hepatitis A, B, C, and human immunodeficiency viruses, urinalysis, a posterior-anterior chest x-ray graphy, and an electrocardiogram was performed. An additional Doppler echocardiogram and/or an abdominal ultrasonography were performed just in case of requirement. Body mass index (BMI) of each case was calculated by measurements of the Same Physician instead of verbal expressions. Weight in kilograms is divided by height in meters squared (6). Office BP were checked after a 5-minute of rest in seated position with mercury sphygmomanometer. Eventually, all smokers were collected into the first, and age and sex-matched non-smokers were collected into the second groups. Mean weight, BMI, systolic and diastolic BP, triglycerides, LDL, HDL, FPG, ESR, CRP, and hematocrit values were detected in each group, and compared in between. Mann-Whitney U test, Independent-Samples T test, and comparison of proportions were used as the methods of statistical analyses.

Results

The study included 150 smokers (51 females and 99 males) and 162 non-smokers (55 females and 107 males). Interestingly, the mean age of the smokers was 45.9 years, and 66.0% of them were male. Although the mean weight, BMI, systolic and diastolic BP, and hematocrit values were similar in both groups, mean triglycerides (163.3 versus 151.8 mg/dL, $p<0.05$), LDL (126.1 versus 117.4 mg/dL, $p<0.05$), ESR (10.8 versus 9.4 mm/h, $p<0.05$), and CRP values (2.5 versus 2.1 mg/L, $p<0.05$) were all higher in the smokers, significantly. On the other hand, mean HDL (41.1 versus 44.0 mg/dL, $p<0.05$) and FPG values (101.9 versus 111.9 mg/dL, $p<0.01$) were lower in the smokers, significantly (Table 1).

Table 1: Comparison of smokers and non-smokers

| Variables | Smokers | p-value | Non-smokers |
|------------------------------|------------------------------|---------|------------------------------|
| Number | 150 | | 162 |
| <i>Male ratio</i> | 66.0% (99) | Ns* | 66.0% (107) |
| Mean age (year) | 45.9 ± 13.4 (19-76) | Ns | 45.2 ± 15.7 (13-77) |
| Weight (kg) | 75.6 ± 14.5 (44-118) | Ns | 74.6 ± 13.0 (45-122) |
| BMI† (kg/m ²) | 26.7 ± 4.5 (16.7-39.4) | Ns | 26.5 ± 4.5 (18.1-41.1) |
| Systolic BP‡ (mmHg) | 128.0 ± 25.0 (90-200) | Ns | 130.2 ± 22.7 (80-200) |
| Diastolic BP (mmHg) | 88.1 ± 12.7 (60-120) | Ns | 88.4 ± 12.0 (60-130) |
| <i>Triglycerides (mg/dL)</i> | 163.3 ± 83.1 (45-385) | <0.05 | 151.8 ± 86.9 (20-410) |
| <i>LDL§ (mg/dL)</i> | 126.1 ± 35.4 (10-282) | <0.05 | 117.4 ± 28.8 (43-185) |
| <i>HDL (mg/dL)</i> | 41.1 ± 9.5 (26-70) | <0.05 | 44.0 ± 9.5 (24-70) |
| <i>FPG** (mg/dL)</i> | 101.9 ± 25.8 (70-309) | <0.01 | 111.9 ± 38.1 (74-327) |
| <i>ESR*** (mm/h)</i> | 10.8 ± 9.7 (1-51) | <0.05 | 9.4 ± 8.0 (1-35) |
| <i>CRP**** (mg/L)</i> | 2.5 ± 2.7 (0-13) | <0.05 | 2.1 ± 2.6 (0-12) |
| Hematocrit (%) | 41.6 ± 5.1 (28-60) | Ns | 41.0 ± 3.7 (31-49) |

*Nonsignificant (p>0.05) †Body mass index ‡Blood pressures §Low density lipoproteins

||High density lipoproteins **Fasting plasma glucose ***Erythrocyte sedimentation rate ****C-reactive protein

Discussion

Obesity may be one of the terminal consequences of the metabolic syndrome since after development of the obesity, nonpharmaceutical approaches provide limited benefit either to heal obesity or to prevent its complications. Excess weight may cause a chronic low-grade inflammation on vascular endothelium, and risk of death from all causes including cardiovascular diseases and cancers increases parallel to the range of excess weight in all age groups (7). The chronic low-grade inflammation may even cause genetic changes on the endothelial cells, and the systemic atherosclerosis may decrease clearance of malignant cells. The effects of excess weight on BP were shown in the literature, extensively (8). For example, incidence of sustained normotension (NT) was higher in the underweight (80.3%) than the normal weight (64.0%, p<0.05) and overweight groups (31.5%, p<0.05), and 52.8% of patients with HT had obesity against 14.5% of patients with the sustained NT (p<0.001) (9). So the dominant underlying cause of the metabolic syndrome appears as weight gain, which may be the main cause of insulin resistance, hyperlipoproteinemias, impaired fasting glucose, impaired glucose tolerance, and white coat hypertension (WCH) via the prolonged low-grade inflammation on vascular endothelium in whole body (10). Prevention of the weight gain with physical activity, even in the absence of a prominent weight loss, will probably result with resolution of many parameters of the syndrome (11-14). According to our experiences, excess weight may actually be a consequence of physical inactivity instead of an excessive eating habit therefore prevention of weight gain cannot be achieved by diet, alone (15). Additionally, limitation of excess weight as an excessive fat tissue around abdomen under the title of abdominal obesity is meaningless instead it should be defined as overweight or obesity via the BMI since adipocytes function as

an endocrine organ, and they produce leptin, tumour necrosis factor (TNF)-alpha, plasminogen activator inhibitor-1, and adiponectin-like cytokines in the plasma (16). The eventual hyperactivities of sympathetic nervous system and renin-angiotensin-aldosterone system are probably associated with elevated BP, insulin resistance, and chronic endothelial inflammation. Similarly, the Adult Treatment Panel III reported that although some people classified as overweight with larger muscular masses, most of them also have excessive fat tissue predisposing to the end-points of the metabolic syndrome (6).

Just after the excess weight, smoking may be the second common cause of vasculitis in the world. It is one of the major risk factors for the atherosclerotic end-organ insufficiencies (1, 17). Its atherosclerotic effect is the most obvious in Buerger's disease. Buerger's disease is an obliterative vasculitis characterized by inflammatory changes in small and medium-sized arteries and veins, and it has never been reported in the absence of smoking. Beside the well-known atherosclerotic effects of smoking, some studies reported that smoking in human being and nicotine administration in animals are associated with lower BMI values (18). Some evidences revealed an increased energy expenditure during smoking both on rest and light physical activity (19), and nicotine supplied by patch after smoking cessation decreased caloric intake in a dose-related manner (20). According to an animal study, nicotine may lengthen inter-meal time, and simultaneously decrease amount of meal eaten (21). Additionally, the BMI seems to be the highest in the former, the lowest in the current, and medium in never smokers (22). Smoking may be associated with a post cessation weight gain, but evidences suggest that risk of the weight gain is the highest during the first year after quitting, and decreases with the following years (23).

Interestingly, the mean weight and BMI were similar both in the smokers and non-smokers in the present study ($p>0.05$ for both). On the other hand, although the CHD was detected with similar prevalence in both genders, prevalences of smoking and COPD were higher in males against the higher BMI, LDL, triglycerides, WCH, HT, and DM in females (24). Beside that, the incidence of myocardial infarctions is increased six-fold in women and three-fold in men who smoked at least 20 cigarettes per day (25). In another word, smoking may be more harmful for women about the atherosclerotic end-points probably due to the higher BMI and its consequences in them. Similarly, smoking is consistently higher in men in the literature (17). Several toxic substances found in cigarette smoke get into the circulation via the respiratory tract, and cause a vascular endothelial inflammation in all systems of the body. For example, smoking may even terminate with irritable bowel syndrome (IBS) and its consequences including chronic gastritis, hemorrhoids, and urolithiasis. There may be several underlying mechanisms terminating with the IBS and its consequences in smokers (26). First of all, smoking-induced vascular endothelial inflammation may disturb epithelial functions for absorption and excretion in the gastrointestinal and genitourinary tracts. These functional problems may terminate with the symptoms and components of the IBS including loose stool, diarrhea, constipation, and urolithiasis. Secondly, diarrheal losses-induced urinary changes may even cause urolithiasis (27, 28). Thirdly, smoking-induced sympathetic nervous system activation may cause motility disorders in the gastrointestinal and genitourinary tracts. Finally, immunosuppression secondary to smoking-induced vascular endothelial inflammation may even terminate with gastrointestinal and genitourinary tract infections causing loose stool, diarrhea, and urolithiasis since some types of bacteria can provoke urinary supersaturation and modify the environment to form crystal deposits in the urine. In fact, 10% of urinary stones are struvite stones which are built by magnesium ammonium phosphate produced during infection with bacteria that possess the enzyme, urease. Similarly, urolithiasis was detected in 17.9% of cases with the IBS, whereas this ratio was 11.6% in cases without the IBS ($p<0.01$) (27).

After the excess weight and smoking, alcohol may be the third common cause of vasculitis in the world. Alcohol is the most dangerous drug, and the only drug that mostly damaged the others. It is causally linked to more than 200 different diseases, conditions, and injuries (29). For example, people hospitalized with alcohol use disorder (AUD) have an average life expectancy of 47-53 years in men and 50-58 years in women, and die 24-28 years earlier than the general population (30). People with AUD have three-fold higher mortality in men and four-fold higher mortality in women (31). A very substantial part of the Danish excess mortality and lower life expectancy compared to Sweden can be attributed to higher mortality related to alcohol and tobacco consumption (7). Women are generally more sensitive than men to the harmful effects of alcohol, primarily due to their smaller body weight, lower capacity to metabolize alcohol, and higher

proportion of body fat. Alcohol can cause liver and brain damages, and its consumption is one of the major leading causes of cancers all over the world (29). Alcohol may even cause loss of consciousness and death in high amounts. Hepatic alcohol dehydrogenase is the main enzymatic system to metabolize alcohol that requires the cofactor nicotinamide adenine dinucleotide (NAD), and the products are acetaldehyde and reduced NAD. Normally, NAD is used to metabolize fats in the liver but alcohol competes with these fats for the use of NAD in drinkers. In another definition, prolonged exposure of alcohol means that fats accumulate in the liver, leading to the term of fatty liver. Acetaldehyde is subsequently metabolized by the aldehyde dehydrogenase into acetate which in turn is broken down into carbon dioxide and water. Ethanol is the only type of alcohol that is found in alcoholic beverages. Ethanol crosses biological membranes and blood-brain barrier via passive diffusion, easily. Alcohol works in the brain primarily by increasing the effects of the gamma aminobutyric acid. This is the major inhibitory neurotransmitter in the brain. Alcohol produces happiness and euphoria, decreased anxiety, increased sociability, sedation, impairment of cognitive, memory, motor, and sensory functions, and generalized depression of central nervous system. Drinking in pregnancy may terminate with fetal disorders, since ethanol is classified as a teratogen. Alcohol is addictive to humans, and can result in AUD, dependence, and withdrawal. Continued alcohol consumption leads to cell death in liver, scarring, cirrhosis, and hepatocellular carcinoma. Prolonged heavy consumption may even cause permanent brain damage. Similarly, alcohol is a major contributing factor of elevated triglycerides in the plasma. It is well-known that plasma triglycerides are sensitive APR in the body (8). Although the cases with regular alcohol consumption were excluded, plasma triglycerides were higher in smokers in the present study (163.3 versus 151.8 mg/dL, $p<0.05$), indicating the inflammatory properties of smoking in the human body.

The acute phase response occurs in case of infection, infarction, foreign body, autoimmune disorder, allergy, neoplasm, trauma, or burn-like stresses of the body. Certain mediators known as APR are increased or decreased during the acute phase response (32, 33). These markers are commonly measured in clinical practice as indicators of acute inflammation in the body. The terms of acute phase proteins and APR are usually used synonymously, although some APR are polypeptides rather than proteins. Positive and negative APR are those whose concentrations increase or decrease during an acute phase response, respectively. The acute phase response is predominantly mediated by the pro-inflammatory cytokines including TNF, interleukin (IL)-1, and IL-6 secreted by immune cells. In case of inflammation, infection, or tissue damage, neutrophil and macrophages release such cytokines into the circulation. The liver and some other organs respond by producing many positive APR to the cytokines. Some of the well-known positive APR are ESR, CRP, fibrinogen, ferritin, procalcitonin, hepcidin, haptoglobin, ceruloplasmin, complement proteins, and serum amyloid A. CRP is

responsible for activation of the complement pathway. Serum CRP rises rapidly, with a maximal concentration reached within two days, and falls quickly once the inflammation has resolved. Measurement of CRP is a useful indicator of inflammations in the clinics. It correlates with ESR, but not always directly. This is due to the ESR being largely dependent upon elevation of fibrinogen with a half-life of one week, approximately. Thus ESR remains higher for a longer period of time despite the removal of the inflammatory stimulus. Whereas CRP rises with a half-life of 6-8 hours rapidly, and then returns to normal in case of a successful treatment, quickly. On the other hand, productions of the negative APR are suppressed at the same time. Some of the well-known negative APR are albumin, transferrin, retinol-binding protein, antithrombin, transcortin, alpha-fetoprotein, and hemoglobin. The suppression of such APR is also used as an indicator of inflammation. Suppression of the synthesis of such negative APR may be due to the protection of amino acids for the production of positive APR, sufficiently. As also observed in the present study, productions of HDL may also be suppressed in the liver during the acute phase responses (34). Similarly, triglycerides, DM, and CHD were higher in patients with plasma HDL values of lower than 40 mg/dL, significantly (34). So HDL may actually behave as negative and triglycerides behave as positive APR in the plasma. Similarly, the highest CHD of the group with HDL values of lower than 40 mg/dL can also be explained by the same hypothesis in the other study (8). Additionally, plasma triglycerides increased whereas HDL decreased during infections (35). On the other hand, a 10 mg/dL increase of plasma LDL values was associated with a 3% lower risk of hemorrhagic stroke (36). Similarly, the highest prevalence of HT and DM parallel to the increased values of LDL and HDL, and the highest prevalence of COPD, CHD, and CRD in contrast to the lowest values of LDL and HDL may show initially positive but eventually negative behaviors of LDL and HDL as the APR (37). Interestingly, the most desired values were between 80 and 100 mg/dL for LDL, between 40 and 46 mg/dL for HDL, and lower than 60 mg/dL for triglycerides in the plasma (8). Parallel to ESR and CRP, plasma triglycerides and LDL may behave as positive whereas HDL and FPG behave as negative APR in smokers in the present study. In another definition, low HDL values should alert clinicians about searching of additional inflammatory pathologies (38-40).

Normally, HDL may show various anti-atherogenic properties including reverse cholesterol transport and anti-oxidative and anti-inflammatory properties (39). However, HDL may become 'dysfunctional' in pathologic conditions which means that relative compositions of lipids and proteins, as well as the enzymatic activities of HDL are altered (39). For example, properties of HDL are compromised in patients with DM by means of the oxidative modification, glycation, and/or transformation of HDL proteomes into proinflammatory proteins. Additionally, the drugs increasing HDL values in the plasma such as niacin, fibrates, and cholesteryl ester transfer protein inhibitors did not reduce all cause mortality, CHD mortality, myocardial

infarction, or stroke (41). In other definition, HDL may just be some indicators instead of being the main actors of the human health. Similarly, BMI, DM, and CHD were the lowest between the HDL values of 40 and 46 mg/dL, and the prevalence of DM was only 3.1% between these values against 22.2% outside these limits (42). Similar to the present study, FPG and HDL were also suppressed in sickle cell diseases (SCD), probably due to the severe inflammatory nature of the diseases (43). Smoking may reduce HDL in the plasma due to the systemic inflammatory effects on vascular endothelium. On the other hand, plasma triglycerides were the only lipids those were not suppressed in pathological weight losses in the body. For example, plasma triglycerides were not decreased instead increased in contrast to the suppressed body weight and BMI in the SCD (44). Similarly, prevalences of excess weight, DM, HT, and smoking were all higher in the hypertriglyceridemia group (200 mg/dL and higher) in the other study (45). On the other hand, the greatest number of deteriorations in the metabolic parameters was observed just above the plasma triglycerides value of 60 mg/dL (46).

As a conclusion, smoking causes a low-grade systemic inflammation on vascular endothelium terminating with an accelerated atherosclerosis-induced end-organ insufficiencies in the body. Plasma triglycerides, LDL, ESR, and CRP may be positive whereas HDL and FPG negative APR indicating the inflammatory effects of smoking in the human body.

References

1. Helvacı MR, Aydın Y, Gundogdu M. Smoking induced atherosclerosis in cancers. *HealthMED* 2012; 6(11): 3744-9.
2. Helvacı MR, Kaya H, Borazan A, Ozer C, Seyhanlı M, Yalcin A. Metformin and parameters of physical health. *Intern Med* 2008; 47(8): 697-703.
3. Helvacı MR, Algin MC, Abyad A, Pocock L. Physical inactivity or an excessive eating habit. *Middle East J Nursing* 2018; 12(1): 14-8.
4. Eckel RH, Grundy SM, Zimmet PZ. The metabolic syndrome. *Lancet* 2005; 365(9468): 1415-28.
5. Helvacı MR, Ayyıldız O, Muftuoglu OE, Yaprak M, Abyad A, Pocock L. Aging syndrome. *World Family Med* 2017; 15(3): 39-42.
6. Third Report of the National Cholesterol Education Program (NCEP) Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults (Adult Treatment Panel III) final report. *Circulation* 2002; 106(25): 3143-421.
7. Juel K. Life expectancy and mortality in Denmark compared to Sweden. What is the effect of smoking and alcohol? *Ugeskr Laeger* 2008; 170(33): 2423-7.
8. Helvacı MR, Yapyak M, Tasci N, Abyad A, Pocock L. The most desired values of high and low density lipoproteins and triglycerides in the plasma. *World Family Med* 2020; 18(8): 21-7.

9. Calle EE, Thun MJ, Petrelli JM, Rodriguez C, Heath CW Jr. Body-mass index and mortality in a prospective cohort of U.S. adults. *N Engl J Med* 1999; 341(15): 1097-105.
10. Helvaci MR, Kaya H, Yalcin A, Kuvandik G. Prevalence of white coat hypertension in underweight and overweight subjects. *Int Heart J* 2007; 48(5): 605-13.
11. Helvaci MR, Kaya H, Duru M, Yalcin A. What is the relationship between white coat hypertension and dyslipidemia? *Int Heart J* 2008; 49(1): 87-93.
12. Franklin SS, Barboza MG, Pio JR, Wong ND. Blood pressure categories, hypertensive subtypes, and the metabolic syndrome. *J Hypertens* 2006; 24(10): 2009-16.
13. Azadbakht L, Mirmiran P, Esmailzadeh A, Azizi T, Azizi F. Beneficial effects of a Dietary Approaches to Stop Hypertension eating plan on features of the metabolic syndrome. *Diabetes Care* 2005; 28(12): 2823-31.
14. Helvaci MR, Ayyildiz O, Gundogdu M, Aydin Y, Abyad A, Pocock L. Excess weight or smoking. *World Family Med* 2018; 16(10): 14-9.
15. Helvaci MR, Ayyildiz O, Gundogdu M, Aydin Y, Abyad A, Pocock L. Body mass and blood pressure. *World Family Med* 2019; 17(1): 36-40.
16. Funahashi T, Nakamura T, Shimomura I, Maeda K, Kuriyama H, Takahashi M, et al. Role of adipocytokines on the pathogenesis of atherosclerosis in visceral obesity. *Intern Med* 1999; 38(2): 202-6.
17. Fodor JG, Tzerovska R, Dorner T, Rieder A. Do we diagnose and treat coronary heart disease differently in men and women? *Wien Med Wochenschr* 2004; 154(17-18): 423-5.
18. Grunberg NE, Greenwood MR, Collins F, Epstein LH, Hatsukami D, Niaura R, et al. National working conference on smoking and body weight. Task Force 1: Mechanisms relevant to the relations between cigarette smoking and body weight. *Health Psychol* 1992; 11: 4-9.
19. Walker JF, Collins LC, Rowell PP, Goldsmith LJ, Moffatt RJ, Stamford BA. The effect of smoking on energy expenditure and plasma catecholamine and nicotine levels during light physical activity. *Nicotine Tob Res* 1999; 1(4): 365-70.
20. Hughes JR, Hatsukami DK. Effects of three doses of transdermal nicotine on post-cessation eating, hunger and weight. *J Subst Abuse* 1997; 9: 151-9.
21. Miyata G, Meguid MM, Varma M, Fetissov SO, Kim HJ. Nicotine alters the usual reciprocity between meal size and meal number in female rat. *Physiol Behav* 2001; 74(1-2): 169-76.
22. Laaksonen M, Rahkonen O, Prattala R. Smoking status and relative weight by educational level in Finland, 1978-1995. *Prev Med* 1998; 27(3): 431-7.
23. Froom P, Melamed S, Benbassat J. Smoking cessation and weight gain. *J Fam Pract* 1998; 46(6): 460-4.
24. Helvaci MR, Kaya H, Gundogdu M. Gender differences in coronary heart disease in Turkey. *Pak J Med Sci* 2012; 28(1): 40-4.
25. Prescott E, Hippe M, Schnohr P, Hein HO, Vestbo J. Smoking and risk of myocardial infarction in women and men: longitudinal population study. *BMJ* 1998; 316(7137): 1043-7.
26. Helvaci MR, Dede G, Yildirim Y, Salaz S, Abyad A, Pocock L. Smoking may even cause irritable bowel syndrome. *World Family Med* 2019; 17(3): 28-33.
27. Helvaci MR, Kabay S, Gulcan E. A physiologic events' cascade, irritable bowel syndrome, may even terminate with urolithiasis. *J Health Sci* 2006; 52(4): 478-81.
28. Helvaci MR, Algin MC, Kaya H. Irritable bowel syndrome and chronic gastritis, hemorrhoid, urolithiasis. *Eurasian J Med* 2009; 41(3): 158-61.
29. Rehm J. Alcohol and mortality. *Alcohol Res* 2014; 35(2): 174-83.
30. Westman J, Wahlbeck K, Laursen TM, Gissler M, Nordentoft M, Hällgren J, et al. Mortality and life expectancy of people with alcohol use disorder in Denmark, Finland, and Sweden. *Acta Psychiatr Scand* 2015; 131(4): 297-306.
31. Roerecke M, Rehm J. Alcohol use disorders and mortality: a systematic review and meta-analysis. *Addiction* 2013; 108(9): 1562-78.
32. Gabay C, Kushner I. Acute-phase proteins and other systemic responses to inflammation. *N Engl J Med* 1999; 340(6): 448-54.
33. Wool GD, Reardon CA. The influence of acute phase proteins on murine atherosclerosis. *Curr Drug Targets* 2007; 8(11): 1203-14.
34. Helvaci MR, Abyad A, Pocock L. High and low density lipoproteins may be negative acute phase proteins of the metabolic syndrome. *Middle East J Nursing* 2020; 14(1): 10-6.
35. Pirillo A, Catapano AL, Norata GD. HDL in infectious diseases and sepsis. *Handb Exp Pharmacol* 2015; 224: 483-508.
36. Ma C, Na M, Neumann S, Gao X. Low-density lipoprotein cholesterol and risk of hemorrhagic stroke: a systematic review and dose-response meta-analysis of prospective studies. *Curr Atheroscler Rep* 2019; 21(12): 52.
37. Helvaci MR, Abyad A, Pocock L. The safest values of low density lipoproteins in the plasma. *World Family Med* 2020; 18(4): 18-24.
38. Toth PP. Cardiology patient page. The "good cholesterol": high-density lipoprotein. *Circulation* 2005; 111(5): 89-91.
39. Femlak M, Gluba-Brzózka A, Cialkowska-Rysz A, Rysz J. The role and function of HDL in patients with diabetes mellitus and the related cardiovascular risk. *Lipids Health Dis* 2017; 16(1): 207.
40. Ertek S. High-density lipoprotein (HDL) dysfunction and the future of HDL. *Curr Vasc Pharmacol* 2018; 16(5): 490-498.
41. Keene D, Price C, Shun-Shin MJ, Francis DP. Effect on cardiovascular risk of high density lipoprotein targeted drug treatments niacin, fibrates, and CETP inhibitors: meta-analysis of randomised controlled trials including 117,411 patients. *BMJ* 2014; 349: 4379.

42. Helvaci MR, Abyad A, Pocock L. What a low prevalence of diabetes mellitus between the most desired values of high density lipoproteins in the plasma. *World Family Med* 2020; 18(7): 25-31.
43. Helvaci MR, Altintas E, Yalcin A, Muftuoglu OE, Abyad A, Pocock L. Positive and negative acute phase reactants in sickle cell diseases. *World Family Med* 2022; 20(3): 36-42.
44. Helvaci MR, Salaz S, Yalcin A, Muftuoglu OE, Abyad A, Pocock L. Cholesterol may be a negative whereas triglycerides positive acute phase reactants in the plasma. *Asclepius Med Res Rev* 2021; 4(1): 1-8.
45. Helvaci MR, Aydin LY, Maden E, Aydin Y. What is the relationship between hypertriglyceridemia and smoking? *Middle East J Age and Ageing* 2011; 8(6).
46. Helvaci MR, Abyad A, Pocock L. The safest upper limit of triglycerides in the plasma. *World Family Med* 2020; 18(1): 16-22.

FACTORS AFFECTING THE PROMOTION OF BACK CARE PRACTICES AMONG NURSES WORKING IN LONG TERM CARE SETTINGS: AN INTEGRATIVE REVIEW

Nagwa Mohamed (1)
Jessie Johnson (1)
Mariam Al Mutawa (2)
Daniel Forgrave (1)

(1) University of Calgary in Qatar

(2) Hamad Medical Corporation, Doha, Qatar

Corresponding author:

Nagwa Mohamed, MN RN,
 University of Calgary in Qatar

Email: nmohd3@hamad.qa

Received: May 2022; Accepted: June 2022; Published: July 2022

Citation: Nagwa Mohamed, Jessie Johnson, Mariam Al Mutawa, Daniel Forgrave. Factors Affecting the Promotion of Back Care Practices Among Nurses Working in Long Term Care Settings: An Integrative Review. Middle East Journal of Nursing 2022; 16(2): 23-32. DOI: 10.5742/MEJN2021.9378024

Abstract

Background: Work-related musculoskeletal injuries and disorders are multifactorial and have diverse negative occupational, economic, and health impacts, including poor quality of life, high compensation costs, and reduced productivity among the working populations. The impact is noticeable among nurses due to the physical demands of their duties, such as patient positioning and mobilization. Several approaches, including back-care programs, have been implemented to prevent negative impact and reduce the incidence of low back pain among nurses. However, back-care practices are influenced by various factors that affect their success among nurses, especially those working in long-term care settings.

Aim: This integrative review aims to identify the factors that promote back-care practices among nurses working in long-term care settings.

Method: This integrative review was guided by Whittemore and Knafl's (2005) framework. Three databases were searched for peer-reviewed studies published between 2011 and 2021 based on set inclusion and exclusion criteria. A hand search was also conducted among the reference lists of the included peer-reviewed articles. The identified articles were critically appraised using the Mixed Methods Appraisal Tool. Data was then extracted, and the various barriers and facilitators

of back-care practices were noted based on the three levels of the Socio-Ecological Model: individual, organizational, and environmental.

Results: Three main factors that influence back-care practices include lack of knowledge among nurses about the programs, lack of organizational support, and lack of maneuvering space.

Conclusion: It is imperative that educational sessions related to the safe handling of patients be provided to nurses to increase their knowledge and implementation of appropriate back-care practices.

Keywords: work-related musculoskeletal injuries, long-term care nurses, back care practices, socio-ecological model

Introduction

The term work-related musculoskeletal disorders (WMSDs) refers to musculoskeletal disorders (MSDs) that worsen due to injuries that happen during work. WMSDs are responsible for morbidity in many working populations and are known as an important occupational problem (Soares et al., 2019). WMSDs are caused by the interactions between various risk factors, which result in conditions that vary across different occupations (Yasobant & Rajkumar, 2014). The most affected regions of the body are the lower back, neck, shoulder, hand, and wrist. WMSDs have a huge impact and are an emerging problem in our modern societies, which lead to detrimental effects on quality of life (Shaw, 2018). These disorders represent the second largest cause of short-term or temporary work disability (Soares et al. 2019). Health-related complaints due to work have become a significant concern because of their negative impact on productivity (Fulton-Kehoe et al., 2000). Apart from lowering the quality of workers' lives and reducing productivity, WMSDs are the most expensive form of work disability, attributing to about 40% of all costs related to the treatment of work-related injuries (Yasobant & Rajkumar, 2014).

Musculoskeletal injuries are the most predominant group of injuries within all healthcare professions (Soares et al., 2019). However, nurses and nursing aids continue to be the most affected individuals due to the daily demands of their work practices, which require such things as mobilizing and positioning dependent patients. Back injuries account for 55% of the annual prevalence of injuries among nurses (Shaw, 2018). A study by the University of Alberta's Faculty of Rehabilitation Medicine found that 65% of orthopedic nurses and 58% of ICU nurses develop debilitating low back pain (LBP) at some point in their careers. In Qatar, Abolfotouh et al. (2015) noted that predictors of LBP are secondary to physical stress exposure. These injuries affect nurses both physically and psychosocially.

Numerous researchers have studied the factors that promote back care practices among nurses, especially those working in long-term care. In this review, long-term care refers to care delivered in hospitals for patients requiring care for a period of more than one year. Currently, the major factors in promoting back care practices are predominately at the individual and organizational levels (Shaw, 2018). Most research studies have documented many instances of the ergonomic hazards nurses experience, but few have discussed the prevention of such occurrences. One such article authored by Boughattas et al. (2017), demonstrated that multiple risk factors are present that impact nurses. These factors include "prolonged work hours, trunk torsion and layout of material" (p. 29). Therefore, this integrative review aims to explore factors related to nurses' back care practices in long-term care settings worldwide.

Methodology

Whittemore and Knafl's (2005) integrative literature review framework was chosen as it is the most appropriate method to address the back-care practices among long-term care nurses.

Problem Identification

Whittemore and Knafl (2005) stated that problem identification is the first phase of integrative review. These authors also stated that a well-defined review objective and variables of significance will facilitate all other phases of a review, particularly the ability to differentiate between relevant and irrelevant information in the data extraction stage. This review has a clear purpose: to identify the factors that promote back care practises for nurses working in long-term care settings.

Literature Search

The literature search in this review was done with the assistance of a librarian. The search was completed using the Cumulative Index to Nursing and Allied Health Literature, Academic Search Complete, and PubMed databases as well as hand search. The keywords used in the search included back care, back pain, low* back pain, back injur*, back hygiene, musculoskeletal*, back disorder*, spinal cord injur*, spinal disord*, spinal pain, lower backache, long term care, long-term care, palliative, hospice, terminal, home care*, nursing home, elderly care, residential care, skilled nurs*, old age home, assist* living, retirement facility, nurse*, and geriatr* nurse*. The Boolean operators AND and OR were used to focus and/or broaden the search. The initial search resulted in 194 possible articles.

Data Evaluation

The 194 articles obtained from the initial search were reviewed to ensure that only the most appropriate articles were included in this review. After removing duplicates, the title and abstracts of 133 articles were reviewed for relevance according to inclusion and exclusion criteria (see Table 1). An additional 81 articles were eliminated through this process. The full text of the remaining 52 articles was also reviewed according to the inclusion and exclusion criteria. Thirty-nine of these articles were eliminated as their study settings were not long-term care or their study populations were not nurses. Thirteen articles were found to be relevant for inclusion in this review. The Mixed Methods Appraisal Tool was used to appraise these 13 articles. Once applied, all articles were found to have high methodological quality.

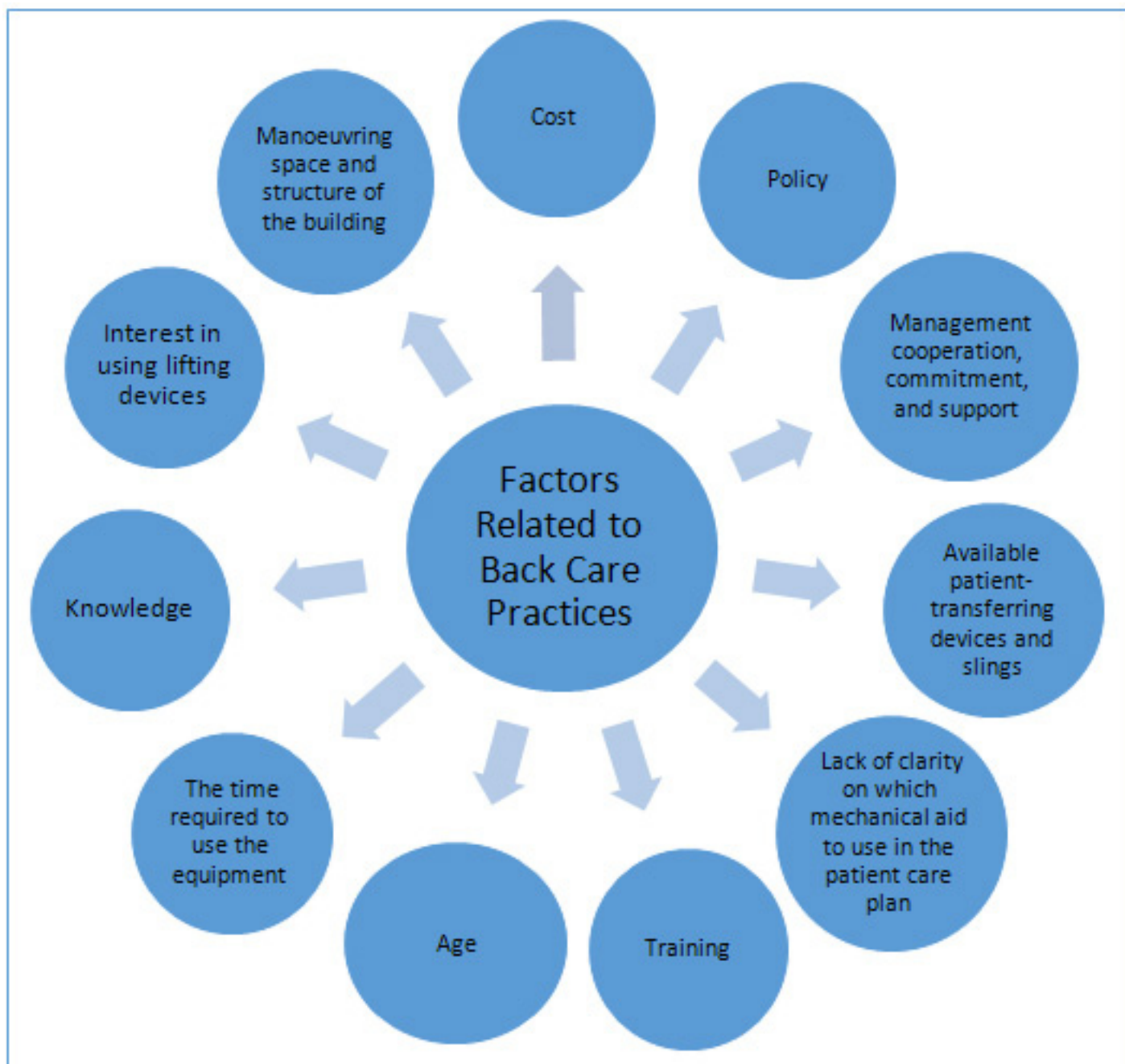
Table 1: Inclusion and Exclusion Criteria

| Inclusion criteria | Exclusion criteria |
|---|--|
| <ul style="list-style-type: none"> • primary qualitative, quantitative, and mixed method studies • studies published in English • studies published between 2011 and 2021 • studies conducted in long term care settings • studies focused on back care practices • studies focused on nurses | <ul style="list-style-type: none"> • not primary studies • studies not published in English • studies published before 2011 • studies not conducted in long term settings • studies not focused on back care practices • studies not focused on nurses |

Data Analysis

According to Whitemore and Knafl (2005), data analysis includes data reduction, data display, data comparison as well as conclusion drawing and verification. In the data reduction process, the identified data is classified using several approaches such as type of evidence, chronology, sample characteristics, or planned conceptual classification (Whitemore & Knafl, 2005). The techniques of data reduction include coding the collected data in a matrix or spreadsheet to provide organized and concise information about the literature. For this review an extraction table was created to analyze and organize the data from the 13 articles. The second phase of data analysis is data display. In this phase, the extracted data is transformed into graphics such as graphs, matrices, charts, and networks (Whitemore & Knafl, 2005). The 11 factors related to the implementation of back care practice programs that were identified in the 13 articles can be found in Figure 1.

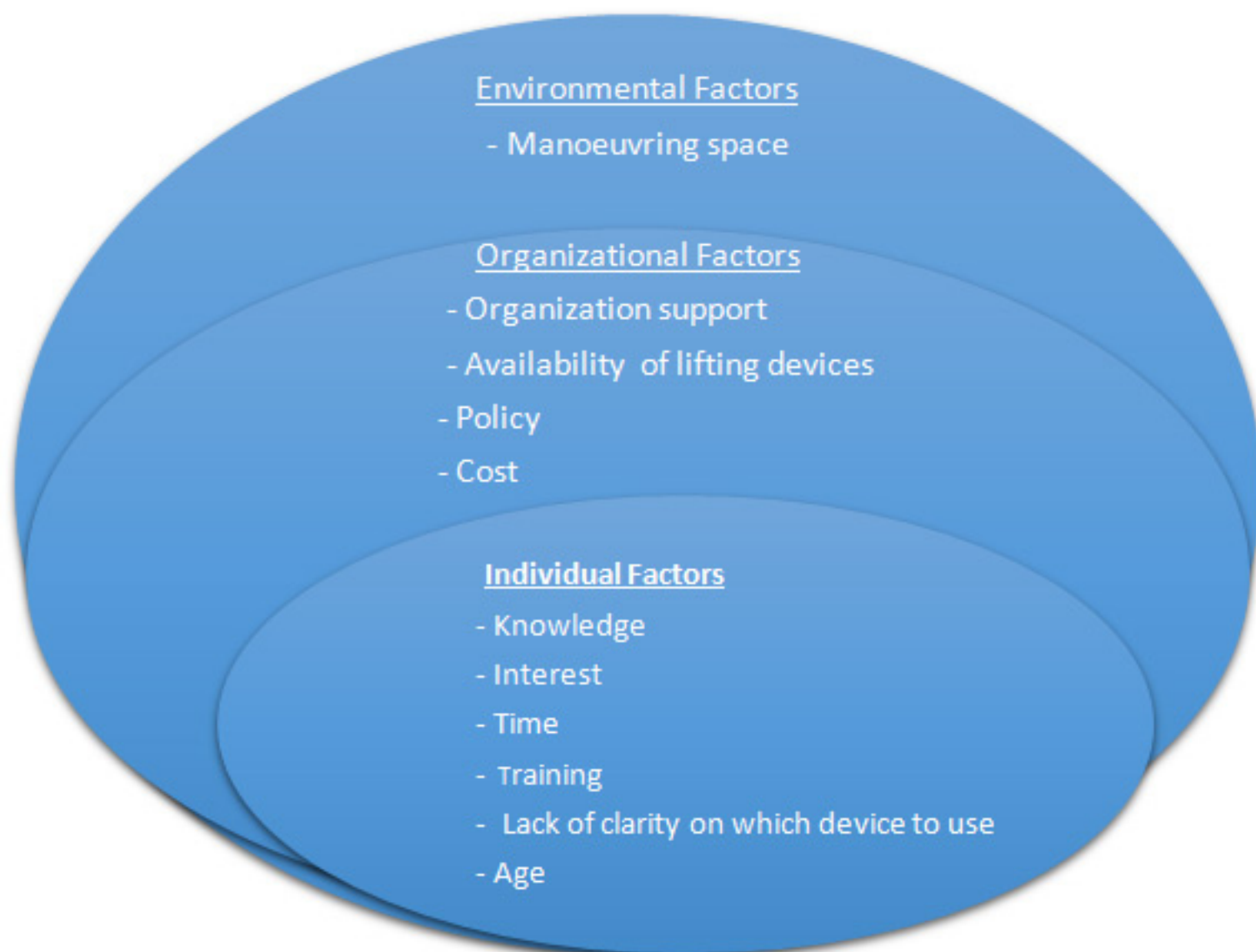
Figure 1: Factors Related to the Implementation of Back Care Practices from the 13 Articles



Data comparison is the next phase in data analysis, which includes a repeated process of evaluating data presentations of primary source data to identify patterns, themes, or relationships (Whittemore & Knafl, 2005). Whittemore and Knafl (2005) stated that similar variables should be grouped together, and a temporal order can be displayed. Relationships between variables or themes can also be represented. Moreover, these authors specified that data comparison and the identification of relevant and accurate patterns and themes require creativity and thorough study of data and data displays.

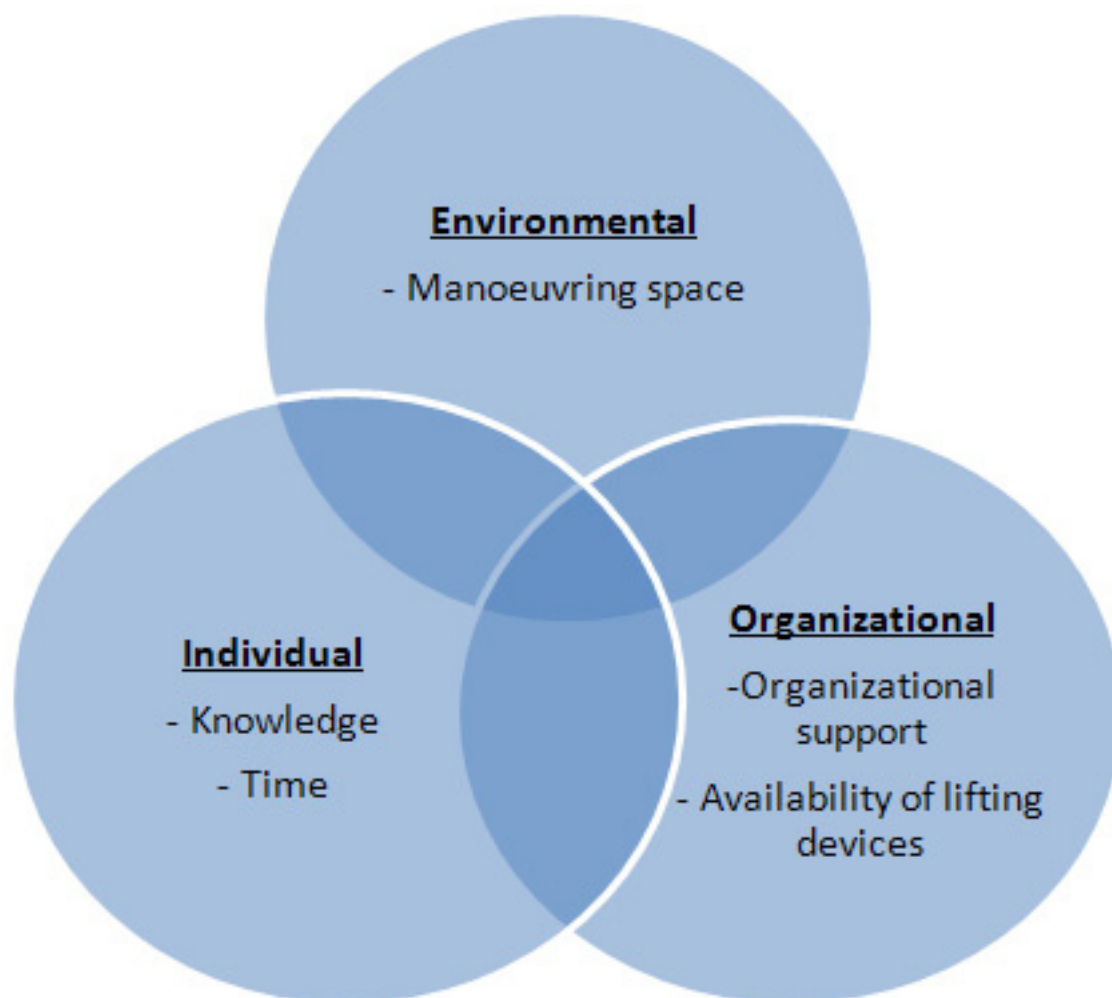
The socio-ecological model (SEM) was found to be an effective framework to identify factors influencing the back-care practices among long term care nurses who experience low back pain. "Social ecological models are visual depictions of dynamic relationships among individuals, groups, and their environments" (Golden et al., 2015, p. 9S). Factors categorized at the three main levels of the SEM can be seen in Figure 2.

Figure 2: Factors Categorized at Three Main Levels of the Socio-Ecological Model



Conclusion drawing and verification is the last phase in the data analysis process in which translation of the process changes from patterns and relation description to the conclusion and abstract level (Whittemore & Knafl, 2005). The main factors related to back care practices among nurses included individual, organizational, and environmental factors. The major themes at each level of the socio-ecological model are found in Figure 3.

Figure 3: Major Themes at Each Level of the Socio-Ecological Model



Results

This review critically examines a total of 13 research articles published between 2011 and 2021. These articles are primary resources that consist of quantitative, qualitative, and mixed-method studies. The primary data examined in this integrative review was obtained from studies conducted in various parts of the world: Germany (n = 4), USA (n = 4), Netherlands (n = 2), Spain (n = 1), Denmark (n = 1), and Canada (n = 1). There were ten quantitative studies: three cross-sectional, one descriptive, one descriptive pre-and post-intervention, one experimental, one longitudinal cohort, one staggered cohort control, one randomized control trial, and one cluster randomized control trial. The cross-sectional studies are Koppelaar et al. (2012), Koppelaar et al. (2013), and Kozak et al. (2017). Koppelaar et al. (2012) studied the effectiveness of ergonomic devices used by nurses in nursing homes on the mechanical load during patient handling activities. Koppelaar et al. (2013) evaluated the individual and organizational factors that affect nurses'

behaviors towards using lifting devices. Kozak et al. (2017) explored the extent that training programs reduce stressful trunk postures among geriatric nurses. In the descriptive study, Kurowski et al. (2017) assessed the incidence of musculoskeletal injury rates among long-term care nurses after the implementation of the safe resident handling program. In the descriptive pre-and post-intervention study, Garg and Kapellusch (2012) examined the long-term effectiveness of the use of patient-handling devices as part of an ergonomics program in reducing musculoskeletal injuries among nurses working in long-term care and chronic care hospitals. In the experimental study, Freitag et al. (2014) investigated the effect of the bending position of nurses on their trunk posture and exertion while doing routine tasks with patients. In the longitudinal cohort study, Gold et al. (2017) examined the prevalence of low back pain among home care nurses after the implementation of a safe resident handling program. In the staggered cohort-control study, Tompa et al. (2016) evaluated the cost benefits of a peer-coaching

programme for the use of patient lifts among nurses in a long-term care setting. In the randomized control trial, Otto et al. (2020) identified the work-related problems that affect nurses working in an elderly care setting and evaluated the effectiveness of the health promotion programs. In the cluster randomized control trial, Stevens et al. (2019) explored the mechanisms for reducing LBP in elderly care workers by using a multifaceted intervention.

The remaining three studies included one qualitative study (Fringer et al., 2014) and two mixed-method studies (O'Brien et al., 2019; Soler-Font et al., 2021). Fringer et al. (2014) examined the attitude of nursing home nurses regarding the implementation of kinaesthetic movement competence training and nurses' experience in integrating the training into their daily practice. O'Brien et al. (2019) studied the benefits of implementation of group-based acceptance and commitment therapy among nurses and nursing aides working in long-term residential settings regarding lifting practices and the associated injuries. Soler-Font et al. (2021) studied the process evaluation of a complex workplace intervention to prevent musculoskeletal pain in nursing staff.

This integrative review is focused on exploring the factors that influence the promotion of back care practices among the long-term care nurses. By using the SEM, the factors affecting the promotion of back care practice have been classified under three different levels of the model: individual, organizational, and environmental.

Individual Level Factors

Knowledge

Lack of knowledge among nurses and nurse trainers has been identified in three research studies as a significant barrier to the implementation of back care programs (Garg & Kapellusch, 2012; Koppelaar et al., 2013; Soler-Font et al., 2021). Inability of nurses to obtain comprehensive information about programs leads to limited knowledge. These three studies further indicated that limited understanding of the programs by nurses due to inadequate training affects the success of the programs. Nurses also have inadequate knowledge about workplace guidelines, which significantly affects their use of lifting devices (Garg & Kapellusch, 2012; Koppelaar et al., 2013). Additionally, Fringer et al. (2014) reported that the negative attitude of nurses towards new concepts due to limited knowledge about kinaesthetics competence training negatively impacted its success. Nurses need to be equipped with enough information and effective training about back-care programs to improve knowledge and facilitate the implementation and success of these programs. Knowledge is presented as a multidimensional factor that is applied to trainers and trainees. This review highlights nurses' preference to be involved only in the personal care activities where they have adequate understanding and information.

Time

Three articles have reported that lack of time among nurses has been one of the factors that influence the promotion of back care programs (Freitag et al., 2014; Fringer et al., 2014; Kurowski et al., 2017). Kurowski et al. (2017) stated that extra time required to use lifting devices causes nurses to think there is no need for using these devices. Similarly, in a study done by Freitag et al. (2014), nurses did not adjust beds to hip height when performing basic patient care even though height-adjustable beds were in many of the test wards, thinking that adjusting the height of the bed required more time. In addition, Fringer et al. (2014) stated that nurses' lack of time to improve their practice and theoretical knowledge about kinaesthetics obstructed the success of the program. Fringer et al. also noted that nurses' involvement with kinaesthetic practice required them to buddy up and work in pairs which required extra time yet encouraged their compliance in lifting and transferring of patients as they critiqued each others' movements. Therefore, allowing adequate time for nurses to provide safe patient handling may lead to increased implementation of proper back care practices.

Organizational Level Factors

Organizational Support

Lack of organizational support was the most evident factor at the organizational level in the literature. Inadequate cooperation among management hinders the application of back-care programs because it inhibits the success of the organizational projects and implementation of new programs (Garg & Kapellusch, 2012). Two studies have noted that poor organizational coordination and lack of funding also negatively influence human resource capacity, physical exhaustion, and resource mobilization (Koppelaar et al., 2013; Stevens et al., 2019). Otto et al. (2020) tested the acceptance of a multifactorial intervention program and observed that organizational culture and management are the most important factors to be considered in such programs.

Availability of Lifting Devices

Lack of enough lifting devices and availability of equipment negatively influences the use of back care programs. Garg and Kapellusch (2012) noted that inadequate patient-transferring devices and slings impeded the adequate application of back-care programs among nurses. The study also highlighted the requirement for lifting devices as tantamount to the success of safe handling practices. Similarly, Koppelaar et al. (2013) noted that a lack of ergonomic devices discouraged nurses from implementing safe back care practices through the structured patient handling program. Moreover, Koppelaar et al. (2012) stated that availability and use of patient lifting devices positively influenced back-care practices as well as the incidence of LBP among nurses. These studies have demonstrated that having adequate lifting devices positively influences nurses' back care practices.

Environmental Level Factors

The overarching theme reported at the environmental level was a lack of manoeuvring space to allow the use of lifting devices. Three studies reported on physical environment factors (Koppelaar et al., 2012; Koppelaar et al., 2013; Kurowski et al., 2017). In these studies, participants reported that a lack of manoeuvring space and room structure acted as environmental factors influencing the use of patient lifting devices as well as back care practices. Kurowski et al. (2017) stated that space constraint limited nurses' and nurse aides' ability to maneuver lifting devices inside and around the patients' rooms. The overarching theme in these cases demonstrates the need to consider space as a factor in the success of back care programs.

Discussion

The findings of this integrative review will allow nurses who work in long-term care, other healthcare providers, and stakeholders to understand the factors that influence the prevalence of LBP. Because nurses play an essential role in supporting health care systems and providing optimal quality of patient care, promoting healthy nurses who are free from MSD would ensure the delivery of high-quality patient care and cost-effective health services.

Individual Level

Inadequate knowledge is the most important barrier at the individual level. Nurses do not comply with back-care programs due to a poor understanding of the concepts and rationale of the programs (Garg & Kapellusch, 2012; Koppelaar et al., 2013). Similarly, Ovayolu et al. (2014) stated that nurses who do not receive back-care education experienced more back pain and reported higher back pain scores. These authors argued that nurses should receive regular education sessions about back care programs to increase knowledge about the use of lifting devices, rules for lifting protocols, and use of body mechanics during patient care activities. Moreover, Tefera et al. (2021) indicated that giving training to nurses is essential as it improves nurses' clinical practices, increases knowledge about patient transferring techniques, and reduces the occurrence of LBP. A study done by Karahan and Bayraktar (2013) showed that training programs to prevent LBP among nurses had a significant effect on nurses' knowledge and improved behavior toward safe patient handling.

The findings from this review indicate that nurses do not use lifting devices as the devices take more time out of their day (Koppelaar et al., 2012; Kurowski et al., 2017). Kucera et al. (2019) also found that nurses prefer not to use lifting devices as their use is time-consuming. Moreover, nurses spend a lot of time on clinical patients' care and have no time to participate in any other activities. Noble and Sweeney (2018) stated that time constraints were a remarkable barrier to the use of assistive devices in patient handling among clinical nurses. Moreover, Schoenfisch et al. (2011) identified that time spent in equipment retrieval, set up, use, and return to storage is more than that spent

on patient lifts and/or transfers, which discourages nurses from using lifting devices and reduces compliance to back care practices. This review shows that nurses with good knowledge about back care practices and the use of lifting devices make enough time to comply with back care practices.

Organizational Level

The findings from this review show that lack of management cooperation, commitment, and support negatively impact back-care practices (Garg & Kapellusch, 2012; Koppelaar et al., 2012; Kurowski et al., 2017). Management engagement and support encourage nurses to constantly be involved in the use of lifting devices (Kucera et al., 2019; Wahlin et al., 2021). Larsen et al. (2019) identified that management has a role in coordinating intervention programs in reducing WMSDs. These researchers also identified that management supports back-care programs by organizing enough staff in the units to avoid staff shortage as well as reduce workload. Coman et al. (2018) stated that management at the organizational level need to study the risk of manual handling to find solutions for this risk, which will support the success of the back-care programs.

This review found that unavailable or unready available lifting devices force nurses to use manual handling instead of following back-care practices (Garg & Kapellusch, 2012; Koppelaar et al., 2012; Koppelaar et al., 2013). Other literature has also supported this finding. Samaei et al. (2017) stated that the unavailability of advanced patient handling equipment is a remarkable risk factor that affects the prevalence of LBP among nurses. Similarly, Noble and Sweeney (2018) declared that the unavailability of lifting devices predisposes long-term care nurses to use the wrong lifting techniques, thus increasing the incidence of LBP. However, the availability of patient lifting equipment encourages nurses to use these devices, thus preventing LBP among nurses (Aljohani & Pascua, 2019; Burdorf et al., 2013).

Lack of specified funding to purchase patient lifting devices reinforces the use of manual handling which increases the prevalence of LBP incidents among long term care nurses. In this review, management's failure to purchase and organize the necessary lifting devices and implement back-care programs was due to unavailability of funding (Garg & Kapellusch, 2012; Tompa et al., 2016). Similarly, Noble and Sweeney (2018) stated that lack of funding is the main reason that hospitals do not support back care programs and purchase lifting devices.

Environmental Level

This review found that maneuvering space affects back-care practices because it limits workflow and basic nursing operations (Koppelaar et al., 2012; Koppelaar et al., 2013). Similarly, Richardson et al. (2018) identified that unorganized workplaces will make it hard for nurses to comply with safe patient handling techniques. This finding

indicates that limited workspace reduces free movement in accessing equipment and working together as a team to safely handle patients. Additionally, Noble and Sweeney (2018) stated that the risk for back injuries can significantly be reduced by providing enough space for nurses to practice safe patient handling and mobility. Thomas and Thomas (2014) stated that assessment and modification of spaces where patients are moved and transferred is required to create enough space for safe patient handling and reduce the incidence of back injuries.

Conclusion

This integrative review was conducted to identify the possible barriers to the promotion of back care practises among nurses working in long-term care settings to ensure effective implementation of back care practices. The main barriers are at the individual, organizational, and environmental levels. At the individual level, lack of knowledge limits nurses' interest and use of back-care programs. At the organizational level, lack of organizational support significantly influences the implementation of back care programs. At the environmental level, lack of maneuvering space limits nurses' ability to use safe patient handling techniques. Managing these barriers will improve nurses' quality of life, quality of patient care, nurses' and patients' satisfaction as well as organizational outcomes.

References

- Abolfotouh, S. M., Mahmoud, K., Faraj, K., Moammer, G., ElSayed, A., & Abolfotouh, M. A. (2015). Prevalence, consequences, and predictors of low back pain among nurses in a tertiary care setting. *International Orthopaedics*, 39(12), 2439–2449. <https://doi.org/10.1007/s00264-015-2900-x>
- Al Johani, W. A., & Pascua, G. P. (2019). Impacts of manual handling training and lifting devices on risks of back pain among nurses: An integrative literature review. *Nurse Media Journal of Nursing*, 9(2), 210–230. <https://doi.org/10.14710/nmjn.v9i2.26435>
- Boughattas, W., Maalel, O. E., Maoua, M., Bougmiza, I., Kalboussi, H., Brahem, A., Chatti, S., Mahjoub, F., & Mrizak, N. (2017). Low back pain among nurses: Prevalence, and occupational risk factors. *Occupational Diseases and Environmental Medicine*, 05(01), 26–37. <https://doi.org/10.4236/odem.2017.51003>
- Burdorf, A., Koppelaar, E., & Evanoff, B. (2013). Assessment of the impact of lifting device use on low back pain and musculoskeletal injury claims among nurses. *Occupational and Environmental Medicine*, 70(7), 491–497. <https://doi.org/10.1136/oemed-2012-101210>
- Coman, R. L., Caponecchia, C., & McIntosh, A. S. (2018). Manual handling in aged care: Impact of environment-related interventions on mobility. *Safety and Health at Work*, 9(4), 372–380. <https://doi.org/10.1016/j.shaw.2018.02.003>
- Freitag, S., Seddouki, R., Dulon, M., Kersten, J. F., Larsson, T. J., & Nienhaus, A. (2014). The effect of working position on trunk posture and exertion for routine nursing tasks: An experimental study. *Annals of Occupational Hygiene*, 58(3), 317–325. <https://doi.org/10.1093/annhyg/met071>
- Fringer, A., Huth, M., & Hantikainen, V. (2014). Nurses' experiences with the implementation of the kinaesthetics movement competence training into elderly nursing care: A qualitative focus group study. *Scandinavian Journal of Caring Sciences*, 28(4), 757–766. <https://doi.org/10.1111/scs.12108>
- Fulton-Kehoe, D., Franklin, G., Weaver, M., & Cheadle, A. (2000). Years of productivity lost among injured workers in Washington state: Modeling disability burden in workers' compensation. *American Journal of Industrial Medicine*, 37(6), 656–662. [https://doi.org/10.1002/\(SICI\)1097-0274\(200006\)37:6<656::AID-AJIM10>3.0.CO;2-C](https://doi.org/10.1002/(SICI)1097-0274(200006)37:6<656::AID-AJIM10>3.0.CO;2-C)
- Garg, A., & Kapellusch, J. M. (2012). Long-term efficacy of an ergonomics program that includes patient-handling devices on reducing musculoskeletal injuries to nursing personnel. *Human Factors*, 54(4), 608–625. <https://doi.org/10.1177/0018720812438614>
- Gold, J. E., Punnett, L., Gore, R. J., & ProCare Research Team. (2017). Predictors of low back pain in nursing home workers after implementation of a safe resident handling programme. *Occupational and Environmental Medicine*, 74(6), 389–395. <http://dx.doi.org/10.1136/oemed-2016-103930>
- Golden, S. D., McLeroy, K. R., Green, L. W., Earp, J. A. L., & Lieberman, L. D. (2015). Upending the social ecological model to guide health promotion efforts toward policy and environmental change. *Health Education & Behavior*, 42(1), 8S–14S. <https://doi.org/10.1177/1090198115575098>
- Karahan, A., & Bayraktar, N. (2013). Effectiveness of an education program to prevent nurses' low back pain: An interventional study in Turkey. *Workplace Health & Safety*, 61(2), 73–78. <https://doi.org/10.1177/216507991306100205>
- Koppelaar, E., Knibbe, H. J., Miedema, H. S., & Burdorf, A. (2012). The influence of ergonomic devices on mechanical load during patient handling activities in nursing homes. *The Annals of Occupational Hygiene*, 56(6), 708–718. <https://doi.org/10.1093/annhyg/mes009>
- Koppelaar, E., Knibbe, J. J., Miedema, H. S., & Burdorf, A. (2013). The influence of individual and organisational factors on nurses' behaviour to use lifting devices in healthcare. *Applied Ergonomics*, 44(4), 532–537. <https://doi.org/10.1016/j.apergo.2012.11.005>
- Kozak, A., Freitag, S., & Nienhaus, A. (2017). Evaluation of a training program to reduce stressful trunk postures in the nursing professions: A pilot study. *Annals of Work Exposures and Health*, 61(1), 22–32. <https://doi.org/10.1093/annweh/wxx002>
- Kucera, K. L., Schoenfisch, A. L., McIlvaine, J. A., Becherer, L., James, T. M., Yeung, Y., Avent, S., & Lipscomb, H. J. (2019). Factors associated with lift equipment use during patient lifts and transfers by hospital nurses and nursing care assistants: A prospective observational cohort study. *International Journal of Nursing Studies*, 91, 35–46. <https://doi.org/10.1016/j.ijnurstu.2018.11.006>

- Kurowski, A., Gore, R., Roberts, Y., Kincaid, K. R., & Punnett, L. (2017). Injury rates before and after the implementation of a safe resident handling program in the long-term care sector. *Safety Science*, 92, 217-224. <https://doi.org/10.1016/j.ssci.2016.10.012>
- Larsen, A. K., Thygesen, L. C., Mortensen, O. S., Punnett, L., & Jørgensen, M. B. (2019). The effect of strengthening health literacy in nursing homes on employee pain and consequences of pain-a stepped-wedge intervention trial. *Scandinavian Journal of Work, Environment & Health*, 45(4), 386-395. <https://doi.org/10.5271/sjweh.3801>
- Noble, N. L., & Sweeney, N. L. (2018). Barriers to the use of assistive devices in patient handling. *Workplace Health & Safety*, 66(1), 41-48. <https://doi.org/10.1177/2165079917697216>
- O'Brien, W. H., Singh, R., Horan, K., Moeller, M. T., Wasson, R., & Jex, S. M. (2019). Group-based acceptance and commitment therapy for nurses and nurse aides working in long-term care residential settings. *Journal of Alternative & Complementary Medicine*, 25(7), 753-761. <https://doi.org/10.1089/acm.2019.0087>
- Otto, A. K., Pietschmann, J., Appelles, L. M., Bebenek, M., Bischoff, L. L., Hildebrand, C., Johnen, B., Jöllenbeck, T., Kemmler, W., Klotzbier, T., Korb, H., Rudisch, J., Schott, N., Schoene, D., Voelcker-Rehage, C., Voge, O., Vogt, L., Weigelt, M., Wilke, J., Zwingmann, K., & Wollesen, B. (2020). Physical activity and health promotion for nursing staff in elderly care: A study protocol for a randomized controlled trial. *BMJ Open*, 10(10), e038202. <https://doi.org/10.1136/bmjopen-2020-038202>
- Ovayolu, O., Ovayolu, N., Genc, M., & Col-Araz, N. (2014). Frequency and severity of low back pain in nurses working in intensive care units and influential factors. *Pakistan Journal of Medical Sciences*, 30(1), 70-76. <https://doi.org/10.12669/pjms.301.3455>
- Richardson, A., McNoe, B., Derrett, S., & Harcombe, H. (2018). Interventions to prevent and reduce the impact of musculoskeletal injuries among nurses: A systematic review. *International Journal of Nursing Studies*, 82, 58-67. <https://doi.org/10.1016/j.ijnurstu.2018.03.018>
- Samaei, S. E., Mostafaei, M., Jafarpour, H., & Hosseiniabadi, M. B. (2017). Effects of patient-handling and individual factors on the prevalence of low back pain among nursing personnel. *Work (Reading, Mass.)*, 56(4), 551-561. <https://doi.org/10.3233/WOR-172526>
- Schoenfisch, A. L., Myers, D. J., Pompeii, L. A., & Lipscomb, H. J. (2011). Implementation and adoption of mechanical patient lift equipment in the hospital setting: The importance of organizational and cultural factors. *American Journal of Industrial Medicine*, 54(12), 946-954. <https://doi.org/10.1002/ajim.21001>
- Shaw, W. (2018). 1622b Low back pain in health care workers: A growing focus on secondary prevention. *Occupational Health for Health Care Workers*. <https://doi.org/10.1136/oemed-2018-icohabstracts.945>
- Soares, C. O., Pereira, B. F., Gomes, M. V. P., Marcondes, L. P., de Campos Gomes, F., & de Melo-Neto, J. S. (2019). Preventive factors against work-related musculoskeletal disorders: Narrative review. *Revista Brasileira de Medicina do Trabalho*, 17(3), 415-430. <https://doi.org/10.5327/Z1679443520190360>
- Soler-Font, M., Ramada, J. M., Merelles, A., Amat, A., de la Flor, C., Martínez, O., Palma-Vasquez, C., Sancho, C., Peña, P., Bültmann, U. & van Zon, S. K. (2021). Process evaluation of a complex workplace intervention to prevent musculoskeletal pain in nursing staff: Results from INTEVAL_Spain. *BMC Nursing*, 20(189). <https://doi.org/10.1186/s12912-021-00716-x>
- Stevens, M. L., Boyle, E., Hartvigsen, J., Mansell, G., Søgaard, K., Jørgensen, M. B., Holtermann, A., & Rasmussen, C. (2019). Mechanisms for reducing low back pain: A mediation analysis of a multifaceted intervention in workers in elderly care. *International Archives of Occupational and Environmental Health*, 92(1), 49-58. <https://doi.org/10.1007/s00420-018-1350-3>
- Tefera, B. Z., Zeleke, H., Abate, A., Abebe, H., Mekonnen, Z., & Sewale, Y. (2021). Magnitude and associated factors of low back pain among nurses working at intensive care unit of public hospitals in Amhara Region, Ethiopia. *PloS One*, 16 (12), e0260361. <https://doi.org/10.1371/journal.pone.0260361>
- Thomas, D. R., & Thomas, Y. L. N. (2014). Interventions to reduce injuries when transferring patients: A critical appraisal of reviews and a realist synthesis. *International Journal of Nursing Studies*, 51(10), 1381-1394. <https://doi.org/10.1016/j.ijnurstu.2014.03.007>
- Tompa, E., Dolinschi, R., Alamgir, H., Sarnocinska-Hart, A., & Guzman, J. (2016). A cost-benefit analysis of peer coaching for overhead lift use in the long-term care sector in Canada. *Occupational and Environmental Medicine*, 73(5), 308-314. <https://doi.org/10.1136/oemed-2015-103134>
- Wählin, C., Stigmar, K., & Nilsson Strid, E. (2021). A systematic review of work interventions to promote safe patient handling and movement in the healthcare sector. *International Journal of Occupational Safety and Ergonomics*, 1-13. <https://doi.org/10.1080/10803548.2021.2007660>
- Whittemore, R., & Knafl, K. (2005). The integrative review: Updated methodology. *Journal of Advanced Nursing*, 52(5), 546-553. <https://doi.org/10.1111/j.1365-2648.2005.03621.x>
- Yasobant, S., & Rajkumar, P. (2014). Work-related musculoskeletal disorders among health care professionals: A cross-sectional assessment of risk factors in a tertiary hospital, India. *Indian Journal of Occupational and Environmental Medicine*, 18(2), 75-81. <https://doi.org/10.4103/0019-5278.146896>

ADDRESSING HEALTH LITERACY IN THE GULF COOPERATION COUNCIL (GCC) COUNTRIES: AN INTEGRATIVE REVIEW PROTOCOL TO SUMMARIZE THE HEALTH LITERACY LANDSCAPE

J Johnson (1)
F Khraim (1)
C Wolsey (1)
N Chowdhury (2)
M M H Raihan (2)
T C Turin (2)

(1) Faculty of Nursing, Univeristy of Calgary, Qatar

(2) Department of Family Medicine, Cumming School of Medicine, Uiversity of Calgary. Calgary, Alberta, Canada

Corresponding author:

J Johnson, RN PhD,
Faculty of Nursing, Univeristy of Calgary
Qatar

Email: jessie.johnson1@ucalgary.ca

Received: May 2022; Accepted: June 2022; Published: July 2022

Citation: Johnson J. et al. Addressing health literacy in the Gulf Cooperation Council (GCC) countries: An integrative review protocol to summarize the health literacy landscape. Middle East Journal of Nursing 2022; 16(2): 33-41.

DOI: 10.5742/MEJN2021.9378025

Abstract

Introduction: In the world of an ever-evolving face of healthcare practice and policies, it is increasingly becoming more imperative that the greater population is enabled to keep up with the pace of changes and reforms in healthcare. However, to do this, we need to ensure healthcare consumers can access, evaluate and create change in a way that is meaningful and understandable to them.

Objective: The aim of this integrative review is to assess health literacy within the GCC countries in order to provide a picture of the state of health literacy.

Method: An integrative review using the Whittemore and Knafl framework was utilized in order to review empirical studies will be undertaken. This study will also look at grey literature in order to review the evidence that is written about health literacy in the GCC countries.

Discussion: The results are expected to provide a landscape of the current practice in the GCC countries as well as to inform future practice related to caregiving and the influence of health literacy on that realm.

Keywords: Health Literacy, GCC Countries, Review protocol, Health Literacy Landscape

Introduction

Health literacy is defined as “the degree to which individuals have the capacity to obtain, process, and understand basic health information and services needed to make appropriate health decisions” (p.11) (Ratzan & Parker, 2000). The current prevalence of health literacy has been reported to be in the range of 7% and 47% within developed nations worldwide. As recent shifts in healthcare encourage patients to be self-directed and motivated toward self-care management, it is necessary to know the health literacy needs of the populations so that healthcare organizations can be responsive to those needs and support patients towards successful self-management of their conditions (Suri et al., 2016).

Health literacy is increasingly becoming known as a pivotal social determinant of health (Nutbeam, 2008; Rowlands et al., 2015). It includes reading, writing, comprehension skills, and the ability to make decisions in order to navigate the health care system (Berkman et al., 2011; Harbour & Grealish, 2018). Health literacy is necessary in order to engage the communities in fundamental healthcare services. This community engagement ensures that healthcare personnel are responsive to the needs of patients, thus increasing the quality of life (Nantsupawat et al., 2020). In order to empower patients and mitigate costs, healthcare organizations must be aware of measures needed to ameliorate these issues. Health literacy of populations has been of concern for decades worldwide (Easton et al., 2013).

The Gulf Cooperation Council (GCC) includes six countries as member states: Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and United Arab Emirates (UAE). A fast-growing population, increased life expectancy, and the rising burden of non-communicable diseases are contributing to greater demands of health and wellness services in the GCC countries (Khoja et al., 2017). There is a need to develop strategies to overcome these challenges and understand the primary prevention and health promotion issues, especially with regards to population health and wellness literacy in these countries as an important first step. A substantial number of the residents of the GCC countries are made up of predominantly expats from several developed and developing countries. This is also coupled with the fact that most people may not understand the native language well, and may not have a good command of English. Thus, it is important to understand the levels and needs of health literacy that exist within these countries (Khoja et al., 2017). However, within the GCC, little is known about health literacy assessment methods, delivery of interventions, and associated outcomes. This integrative review aims to explore health literacy assessment, intervention delivery, and outcomes within this region. The overarching aim of this integrative review is to systematically explore the literature related to health literacy assessment within the GCC.

Methods

We will apply the Whittemore and Knafl (2005) integrative review methodology for this literature review. An integrative review helps obtain a clear understanding of a complex and dynamic topic (Soares et al., 2014). This review method gathers data from studies without restraining any specific study methods, thus enhancing the achievement of comprehensive knowledge on this topic to inform policy (Broome, 2000). We use the updated methodology suggested by Whittemore and Knafl (2005), which adds sufficient rigour to the study that systematically extracts the relevant qualitative and quantitative information, compares and collates them to synthesize useful knowledge for identifying and resolving multisectoral and composite health and wellness practice and policy (Soares et al., 2014; Whittemore & Knafl, 2005). We will follow the five stages of integrative review in this study that include (1) problem identification; (2) literature search; (3) data evaluation; (4) data analysis; and (5) presentation (Whittemore & Knafl, 2005).

Stage 1: Problem identification

Clear identification of the research/guiding question(s) is necessary for a high-quality integrative review (Whittemore & Knafl, 2005). To achieve the research objective we will conduct a thorough and systematic exploration of the relevant theoretical/conceptual, empirical, and grey literature on health literacy (HL) among GCC countries in light of the following guiding questions:

1. What assessments for health literacy have currently been conducted within the healthcare professions in the GCC?
2. What has been the approach to collecting data on health literacy in the GCC?
3. What interventions and programs have been completed addressing health literacy?
4. What is the impact or outcomes of implementing interventions aimed at promoting health literacy?

Stage 2: Literature search

Search terms and databases: With consultation with a health sciences librarian, we developed a preliminary search strategy. First of all, a set of databases were selected to search for relevant articles that include major academic databases such as MEDLINE (Ovid), PubMed, EMBASE, PsycINFO, CINAHL, and Web of Science and an Arabic database Al Manhal. We also selected some grey literature sources/databases namely, Google, Google Scholar, OAIster, and GCC government websites (see Table 1 for the complete list). Also, using the recommendation by the Canadian Institute for Health Information (CIHI, 2011) we will include only the first 100 results from the high-yielding grey literature sources such as Google, Google Scholar, and OAIster (WorldCat) to ensure relevant studies were extracted. Secondly, a comprehensive list of search terms related to each term of

Table 1: List of searched databases

| For published articles | For grey literature |
|--|--|
| <ol style="list-style-type: none"> 1. MEDLINE (Ovid) 2. PubMed 3. EMBASE 4. CINAHL Plus with Full-text 5. PsycINFO 6. Psychology & Behavioral Sciences Collection 7. Sociological Abstracts 8. Social Services Abstracts 9. Social Work Abstracts 10. SocINDEX with Fulltext 11. Cochrane Library 12. Cochrane Database of Systematic Reviews 13. Web of Science 14. Al Manhal | <ol style="list-style-type: none"> 1. Google Scholar 2. Google 3. ProQuest (Theses and dissertations) 4. OAIster (WorldCat) 5. OpenGrey 6. GCC governmental websites <ol style="list-style-type: none"> a. Secretariat General of the GCC, https://www.gcc-sg.org/en-us/Pages/default.aspx) b. World Bank GCC, https://www.worldbank.org/en/country/gcc c. Co-operation Council for the GCC, https://www.fatf-gafi.org/pages/co-operation-council-for-the-arab-states-of-the-gulf-gcc.html d. Gulf Cooperation Council https://arab.org/directory/gulf-cooperation-council/ e. Global Edge: GCC Resources, https://globaledge.msu.edu/trade-blocs/gcc/resources f. GCC-STAT, https://gccstat.org/en/ Middle East Policy Council https://mepc.org/commentary/gulf-cooperation-council-meets-kuwait g. Arabic collection online https://dlib.nyu.edu/aco/ h. Preprints- https://www.hsli.pitt.edu/preprint i. E-Marefa |

this topic such as 'Health literacy' and 'GCC countries' was selected that includes Medical Subject Heading (MeSH) terms as well as keywords to identify relevant articles (see Table 2 for complete list). Each set of the keywords for similar terms will be connected by the Boolean operator 'OR' followed by linking them with other sets of terms using the Boolean operator 'AND'. To expand the search, we will use the citation pearl-growing approach, which essentially includes a review of the reference list of relevant systematic reviews and other articles to find potentially eligible articles that might be missed during the search. We will also employ a single citation search to retrieve all relevant articles through PubMed.

Inclusion and exclusion of studies: A clear set of inclusion and exclusion criteria were developed by our research team to select articles relevant to our research objectives (Table 3). We will not limit the inclusion based on the time of publication and will include both English and Arabic language. Original research articles will be included mainly in this review, which might be qualitative, quantitative, or mixed-method studies. Any literature reviews, books/book chapters, commentaries and editorials will be excluded from this review.

Two-stage screening of articles: We will use a software platform – Covidence to coordinate the screening process between the research team members for this review. All extracted articles will be uploaded to Covidence followed by duplicate removal and setting up the inclusion and exclusion criteria in the software system (Covidence systematic review software, Veritas Health Innovation, Melbourne, Australia. <http://www.covidence.org>). The screening will be divided into two stages: (i) title and abstract screening, and (ii) full-text review (Figure 1) completed by two members of the research team individually and blindly. The abstracts will be classified as relevant, potentially relevant, or not relevant. The articles that met inclusion criteria and were agreed upon by both the reviewers will be moved to the next stage for full-text review. The articles that cannot be decided to include or not include based on the abstracts only will also be considered for full-text review. The full-text review will be conducted by the same reviewers. An eligible article will be considered to extract data for this review. We will expect an 80% agreement between the two reviewers. If the reviewers disagree on any articles, a third reviewer will resolve the conflict.

Stage 3: Data evaluation

For data extraction, we have already developed a schema. The information following the schema will be extracted from the articles using Microsoft Excel spreadsheet (Microsoft Office, Redmond, Washington, USA). The schema includes study characteristics, presented in Table 4, and topic-specific i.e., health literacy-related information presented in Table 5. The data extraction will be performed by one member, however, another member will randomly double-check some of the extracted data to

remove the bias and ensure the accuracy of the findings. In case of any disagreements, a discussion will be arranged between the research team members to come to a consensus.

Stage 4: Data analysis: a qualitative synthesis of the studies

An integrative review retrieves a broader description of the research topic and generally reports the synthesized result in a narrative format (Whittemore & Knafl, 2005). We will apply Ritchie & Spencer's (2002) five-stage process for the synthesis of our findings.

- (1) Familiarization – being familiar with the data contents.
- (2) Identifying a thematic framework – identifying key issues, concepts and themes.
- (3) Indexing – systematically applying the thematic framework to the data.
- (4) Charting – rearranging the data according to the appropriate thematic reference.
- (5) Mapping and interpretation – identifying the key characteristics of the data.

Full text of the eligible articles will be shared with all team members for familiarizing the data. The coding guide will be developed based on the key issues, ideas, concepts, and themes. Health literacy-related outcomes, practices, approaches, initiatives, interventions, and tools will be extracted for study. We will use both inductive and deductive coding to identify and organize themes. The process of familiarization with the data and coding for themes will be carried out separately. Initial themes identified through coding will be shared with the team members to discuss, collate, and evaluate through an analytical framework to derive more extensive themes and categories. One team member will do the indexing and outlining of individual study findings in light of the extensive themes and categories, whereas the entire team will cross-check the mapping and interpretation based on key characteristics of the framework. The accuracy and relevance will be assessed by the team as well. The accuracy and relevance of the findings will be assessed by the team as well. Using the "framework" method will aid an extensive approach for analyzing and synthesizing the evidence (Armstrong et al., 2007).

Stage 5: Presentation

Using both the tabular and narrative format the results will be synthesized from the analysis of the extracted data using the "framework" method. We will also discuss the current state of the knowledge and evidence of practice and policies around health literacy in this region and the future implications for research, practice, and population health. We will also appraise the quality of the studies and the strength of evidence will be outlined in this stage.

Table 2: List of search keywords

| |
|---|
| Search terms for health literacy: |
| "health literacy" [Keyword, MeSH]; Patient Education as Topic [MeSH]; "health education" [Keyword, MeSH]; "patient education handout" [Keyword, MeSH]; "health promotion" [Keyword, MeSH]; "health behaviour" [Keyword]; "health behavior" [Keyword, MeSH]; |
| Search terms for Gulf Cooperation Council countries |
| "Gulf Cooperation Council" [Keyword]; GCC [Keyword]; "GCC countries" [Keyword]; "Gulf Cooperation Council countries" [Keyword]; Gulf region [Keyword]; Gulf countries [Keyword]; Bahrain [Keyword, MeSH]; Kuwait [Keyword, MeSH]; Oman [Keyword, MeSH]; Qatar [Keyword, MeSH]; "Saudi Arabia" [Keyword, MeSH]; "United Arab Emirates" [Keyword, MeSH]; UAE [Keyword] |
| Search terms for intervention |
| Intervention [Keyword]; Trial [Keyword]; |

Table 3: Inclusion and exclusion criteria

| | |
|--------------------|--|
| Inclusion criteria | <ol style="list-style-type: none"> 1. <i>Studies</i>: original research with any health literacy intervention 2. <i>Populations</i>: research focusing on GCC countries 3. <i>Design</i>: any types of studies 4. <i>Outcomes</i>: includes, but not limited to, improved health literacy |
| Exclusion criteria | <ol style="list-style-type: none"> 1. Studies not describing active health literacy initiative or issues around health literacy. 2. If the description of the health literacy lacked detail such that it was unclear if there was a health literacy approach and/or activity 3. No original studies; e.g. publications in the form of editorials, reviews, or opinion articles 4. Studies not in English or Arabic |

Quality assessment of the selected studies

We will check the credibility and transferability of the findings of the eligible studies. As an integrative review, our review is likely to have studies from diverse methodologies. Quantitative studies will be assessed using the guidelines of the Cochrane Collaboration for health promotion and public health interventions (Armstrong et al., 2007). We will use certain parameters to assess different aspects of study quality such as the appropriateness of study design, methods, selective reporting, ascertainment of outcomes, attrition, key confounding factors, the rigour of analysis, and sample size. To evaluate credibility, dependability, conformability, transferability, authenticity, and relevance of qualitative studies we will use the Qualitative Research Quality Checklist (QRQC) (Saini & Shlonsky, 2012) a 25-point quality assessment checklist. For the mixed-method studies, the revised Mixed Methods Appraisal Tool (MMAT) will be used (Pluye et al., 2011). Credibility is an important issue, especially for grey literature. Using the Authority, Accuracy, Coverage, Objectivity, Date, and Significance (AACODS) checklist (Tyndall, 2010) we will ensure the information extracted from Grey literature sources are credible. We expect very few studies including a discussion of methodology, limitations, and data collection process in the studies identified through grey literature search as they contain mostly individual websites, reports, evaluations, or other types of materials rather than research studies. Therefore, we will mainly focus on authority to assess credibility. We will also employ a domain-dependent criteria, "Technical criteria" (Eysenbach et al., 2002) to focus on how the information is presented or what meta information is available. Two reviewers will assess the quality of the studies independently using a pre-defined set of questions. Any disagreement will be resolved through further discussion or by the help of a third reviewer, if necessary.

Discussion

Anticipated outcomes:

The purpose of this comprehensive integrative review is to identify and assess existing health literacy-related assessment plans, interventions, and programs to improve health literacy in GCC countries. With this study, we will be able to assemble all such activities to create a knowledge baseline on this topic. We will also know the needs and demands of health literacy among these populations. Barriers, facilitators, and outcomes of the existing health literacy interventions will be identified as well. What type of programs may work for these populations and what does not work will be determined through this study.

Potential impact:

The findings from this integrative review will significantly contribute to increasing our knowledge in this area. Research and policy gaps will be identified to develop strategies and plan future interventions to improve health literacy. The knowledge of the extent of the need for health literacy among different parts of the region will help devise area and population-specific intervention programs.

Evidence-based programs could be designed having the information on the outcomes and success of previous endeavours. Overall, this research will contribute to the improvement of the health and wellness of the citizens of the GCC countries.

Strengths

We have already developed a thorough and detailed search strategy to obtain the relevant articles. We also have created a robust data extraction tool that puts us in a strong position to carry out the study smoothly and synthesize results effectively and efficiently. We have also consulted with the knowledge users during this process. This approach will also help us reach maximum knowledge mobilization and community engagement. Our research team is also highly experienced in conducting all sorts of literature reviews and working with health literacy and relevant topics.

Limitations

Nevertheless, there are also some limitations and challenges of this study. We will only include original articles, whereas other types of articles such as reviews, environmental scans, editorial etc. may contain useful information that we might not identify. As an integrative review, we will keep our research question relatively broad and will not restrict it to any methodological framework, which may yield less specific results that might be difficult to practice for a policy change.

Patient and Public Involvement:

During the development of the research objective, guiding questions, search strategy, and data extraction tool, we have consulted with the knowledge users to ensure the appropriateness of the research approach. We will also involve them in the analysis and interpretation stages to ensure the contextualization of the results. We will also involve community scholars, citizen researchers, and policy stakeholders in the final presentation of the findings to mobilize the knowledge and relate the findings for policy implications.

Knowledge Translation

Our knowledge translation strategy includes approaches to include both academic and non-academic audiences. For academic audiences, we will publish the review findings in an open-access journal. We will also present our findings at academic conferences. For community and policy stakeholders we will create an infographic, a lay summary, and social media posts to mobilize the findings to wider audiences to bring quicker impacts.

Declarations

The authors declare that there is no conflict of interest.

The author(s) received no financial support for the research, authorship, and/or publication of this article.

Table 4: Study characteristics

| Study | Objective | Location | Target population | Study design | Population size | Key findings | Key conclusions |
|-------|-----------|----------|-------------------|--------------|-----------------|--------------|-----------------|
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |

Table 5: Description of health literacy initiatives in included studies

| Study | Content of health literacy | Health literacy Activities | Settings | Description of the initiative | Level of community engagement | Partners from knowledge-users |
|-------|----------------------------|----------------------------|----------|-------------------------------|-------------------------------|-------------------------------|
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

Figure 1: Flow diagram of search and selection process for the systematic integrative review (adapted from diagram for systematic review)

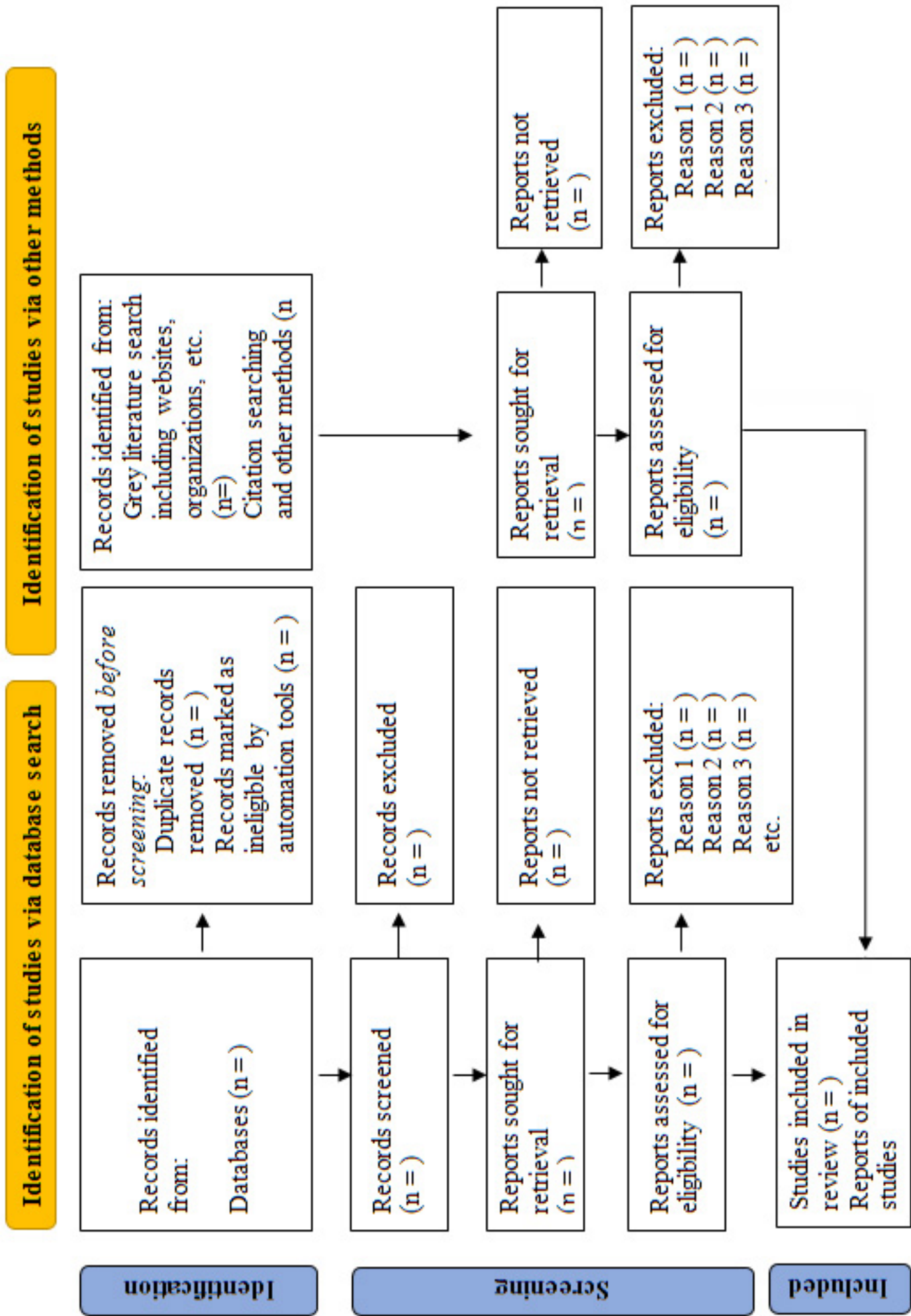


Figure 1: Flow diagram of search and selection process for the systematic integrative review (adapted from diagram for systematic review)

References

- Armstrong, R., Waters, E., Jackson, N., Oliver, S., Popay, J., Shepherd, J., Petticrew, M., Anderson, L., Bailie, R., & Brunton, G. (2007). *Guidelines for Systematic reviews of health promotion and public health interventions*. Australia: Melbourne University.
- Berkman, N. D., Sheridan, S. L., Donahue, K. E., Halpern, D. J., Viera, A., Crotty, K., Holland, A., Brasure, M., Lohr, K. N., Harden, E., Tant, E., Wallace, I., & Viswanathan, M. (2011). Health literacy interventions and outcomes: an updated systematic review. *Evid Rep Technol Assess (Full Rep)*(199), 1-941.
- Broome, M. E. (2000). Integrative literature reviews for the development of concepts. *Concept development in nursing: foundations, techniques and applications*. Philadelphia: WB Saunders Company, 231-250.
- CIHI. (2011). Urban physical environments and health inequalities: Literature search methodology paper. https://www.cihi.ca/sites/default/files/cphi_upe_litsearch_method_en_0.pdf [Accessed October 18 2019].
- Covidence systematic review software, Veritas Health Innovation. Melbourne, Australia. <http://www.covidence.org>.
- Easton, P., Entwistle, V. A., & Williams, B. (2013). How the stigma of low literacy can impair patient-professional spoken interactions and affect health: insights from a qualitative investigation. *BMC Health Serv Res*, 13, 319. <https://doi.org/10.1186/1472-6963-13-319>
- Eysenbach, G., Powell, J., Kuss, O., & Sa, E.-R. (2002). Empirical studies assessing the quality of health information for consumers on the world wide web: a systematic review. *Jama*, 287(20), 2691-2700.
- Harbour, P., & Grealish, L. (2018). Health literacy of the baby boomer generation and the implications for nursing. *Journal of Clinical Nursing*, 27(19-20), 3472-3481. <https://doi.org/https://doi.org/10.1111/jocn.14549>
- Khoja, T., Rawaf, S., Qidwai, W., Rawaf, D., Nanji, K., & Hamad, A. (2017). Health care in Gulf Cooperation Council countries: a review of challenges and opportunities. *Cureus*, 9(8), e1586.
- Nantsupawat, A., Wichaikhum, O.-A., Abhicharttibutra, K., Kunaviktikul, W., Nurumal, M. S. B., & Poghosyan, L. (2020). Nurses' knowledge of health literacy, communication techniques, and barriers to the implementation of health literacy programs: A cross-sectional study [<https://doi.org/10.1111/nhs.12698>]. *Nursing & Health Sciences*, 22(3), 577-585. <https://doi.org/https://doi.org/10.1111/nhs.12698>
- Nutbeam, D. (2008). The evolving concept of health literacy. *Social Science & Medicine*, 67(12), 2072-2078. <https://doi.org/https://doi.org/10.1016/j.socscimed.2008.09.050>
- Page MJ, McKenzie JE, Bossuyt PM, Boutron I, Hoffmann TC, Mulrow CD, et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. *BMJ* 2021;372:n71. doi: 10.1136/bmj.n71.
- Pluye, P., Robert, E., Cargo, M., Bartlett, G., O'Cathain, A., Griffiths, F., Boardman, F., Gagnon, M.P., & Rousseau, M.C. (2011). Proposal: A mixed methods appraisal tool for systematic mixed studies reviews. <https://www.scienceopen.com/document?vid=feb74b8c-08fd-4b8c-ad08-65f7c2b8108e>
- Ratzan, S., & Parker, R. (2000). Introduction. In C. Selden, M. Zorn, S. Ratzan, & R. Parker (Eds.), *National Library of Medicine current bibliographies in medicine: health literacy*. National Institutes of Health, U.S. Department of Health and Human Services.
- Ritchie, J., & Spencer, L. (2002). Qualitative data analysis for applied policy research. In *Analyzing qualitative data* (pp. 187-208). Routledge.
- Rowlands, G., Shaw, A., Jaswal, S., Smith, S., & Harpham, T. (2015). Health literacy and the social determinants of health: a qualitative model from adult learners. *Health Promotion International*, 32(1), 130-138. <https://doi.org/10.1093/heapro/dav093>
- Saini, M., & Shlonsky, A. X. (2012). *Systematic synthesis of qualitative research*. OUP USA.
- Soares, C. B., Hoga, L. A. K., Peduzzi, M., Sangaleti, C., Yonekura, T., & Silva, D. R. A. D. (2014). Integrative review: concepts and methods used in nursing. *Revista da Escola de Enfermagem da USP*, 48(2), 335-345.
- Suri, V. R., Majid, S., Chang, Y. K., & Foo, S. (2016). Assessing the influence of health literacy on health information behaviors: A multi-domain skills-based approach. *Patient Educ Couns*, 99(6), 1038-1045. <https://doi.org/10.1016/j.pec.2015.12.017>
- Tyndall, J. (2010). AACODS Checklist. Flinders University. <http://dspace.flinders.edu.au/dspace/>
- Whittemore, R., & Knafl, K. (2005). The integrative review: updated methodology. *Journal of advanced nursing*, 52(5), 546-553.

POSITIVE AND NEGATIVE ACUTE PHASE REACTANTS IN SMOKERS

Mehmet Rami Helvaci (1)
Engin Altintas (1)
Atilla Yalcin (1)
Orhan Ekrem Muftuoglu (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

Corresponding Author:

Mehmet Rami Helvaci, M.D.
07400, ALANYA, Turkey
Phone: 00-90-506-4708759
Email: mramihelvaci@hotmail.com

Received: May 2022; Accepted: June 2022; Published: July 2022

Citation: Helvaci M R et al. Positive and negative acute phase reactants in smokers. Middle East Journal of Nursing 2022; 16(2): 42 - 48. DOI: 10.5742/MEJN2021.9378026

Abstract

Background: We tried to understand whether or not there are some positive and negative acute phase reactants (APR) indicating the possible inflammatory effects of smoking on vascular endothelium.

Method: Consecutive daily smokers at least with a history of one pack-year and age and sex-matched non-smokers were taken into the study. Cases with regular alcohol consumption (one drink a day) and patients with inflammatory, infectious, or devastating disorders, or heart failure were excluded.

Results: The study included 247 smokers (173 males) and 167 non-smokers. Interestingly, the mean age of the smokers was 46.2 years, and 70.0% of them were males. Although the mean body weight, body mass index, systolic and diastolic blood pressures, and hematocrit values were similar in both groups, plasma triglycerides (163.1 versus 151.3 mg/dL, $p<0.05$), low density lipoproteins (LDL) (123.8 versus 117.5 mg/dL, $p<0.05$), erythrocyte sedimentation rate (ESR) (10.6 versus 9.3 mm/h, $p<0.05$), and C-reactive protein (CRP) (2.3 versus 2.0 mg/L, $p<0.05$) values

were all higher in the smokers, significantly. On the other hand, high density lipoproteins (HDL) (40.9 versus 44.0 mg/dL, $p<0.05$) and fasting plasma glucose (FPG) (102.3 versus 111.6 mg/dL, $p=0.007$) values and prevalence of diabetes mellitus (8.9% versus 14.3%, $p<0.05$) were all lower in the smokers, significantly.

Conclusion: Smoking may cause a low-grade systemic inflammation on vascular endothelium terminating with an accelerated atherosclerotic process-induced end-organ insufficiencies all over the body. Plasma triglycerides, LDL, ESR, and CRP may be positive whereas HDL and FPG may be negative APR indicating such inflammatory effects in the body.

Key words: Smoking, triglycerides, low density lipoproteins, erythrocyte sedimentation rate, C-reactive protein, high density lipoproteins, fasting plasma glucose

Introduction

The endothelium is a monolayer of endothelial cells which builds up the inner cellular lining of arteries, veins, capillaries, and lymphatics. It may be the major player in the control of blood fluidity, platelets aggregation, and vascular tone. It may be the major actor in immunology, inflammation, and angiogenesis. It may also be important in the endocrinology. The endothelial cells control vascular tone and blood flow by synthesizing and releasing nitric oxide, metabolites of arachidonic acid, and reactive oxygen species. They are also important for generation of vasoactive hormones such as angiotensin II. An endothelial dysfunction linked to an imbalance between the synthesis and release of these endothelial factors may explain the initiation of several cardiovascular pathologies including hypertension (HT) and atherosclerosis. On the other hand, overweight and obesity, smoking, and alcohol are well-known causes of chronic endothelial inflammation terminating with an accelerated atherosclerotic process-induced end-organ insufficiencies in the human body (1, 2). Chronic endothelial damage may be the major underlying cause of aging and death by causing end-organ insufficiencies in the human being. Much higher blood pressures (BP) of the afferent vasculature may be the major accelerating factor by causing recurrent injuries on vascular endothelium. Probably, whole afferent vasculature including capillaries are mainly involved in the process. Thus the term of venosclerosis is not as famous as atherosclerosis in the medical literature. Due to the chronic endothelial damage, inflammation, edema, and fibrosis, vascular walls thicken, their lumens narrow, and they lose their elastic natures, those eventually reduce blood supply to the terminal organs, and increase systolic and decrease diastolic BP further. Some of the well-known accelerating factors of the inflammatory process are physical inactivity, animal-rich diet, excess weight, smoking, alcohol, chronic inflammations, prolonged infections, and cancers for the development of terminal consequences including obesity, HT, diabetes mellitus (DM), cirrhosis, peripheral artery disease (PAD), chronic obstructive pulmonary disease (COPD), coronary heart disease (CHD), chronic renal disease (CRD), mesenteric ischemia, osteoporosis, stroke, dementia, other end-organ insufficiencies, and finally early aging and premature death (3). Although early withdrawal of the accelerating factors may delay such terminal consequences, after development of HT, DM, cirrhosis, COPD, CRD, CHD, PAD, mesenteric ischemia, osteoporosis, stroke, dementia, other end-organ insufficiencies, and aging, endothelial changes can not be reversed completely due to their fibrotic natures. The accelerating factors and terminal consequences are researched under the titles of the metabolic syndrome, aging syndrome, and accelerated endothelial damage syndrome in the medical literature, extensively (4, 5). We tried to understand whether or not there are some positive and negative acute phase reactants (APR) indicating the possible inflammatory effects of smoking on the vascular endothelium all over the body.

Material and methods

The study was performed in the Internal Medicine Polyclinic of the Dumlupinar University between August 2005 and March 2007. Consecutive daily smokers at least with a history of one pack-year were taken into the study. Cases with regular alcohol consumption (one drink a day) and patients with inflammatory, infectious, or devastating disorders including eating disorders, malignancies, acute or chronic renal failure, cirrhosis, COPD, hyper- or hypothyroidism, and heart failure were excluded. A routine check up procedure including hemogram, erythrocyte sedimentation rate (ESR), C-reactive protein (CRP), fasting plasma glucose (FPG), triglycerides, low density lipoproteins (LDL), high density lipoproteins (HDL), albumin, creatinine, thyroid function tests, hepatic function tests, markers of hepatitis A, B, C, and human immunodeficiency viruses, urinalysis, a posterior-anterior chest x-ray graphy, and an electrocardiogram was performed. An additional Doppler echocardiogram and/or an abdominal ultrasonography were performed just in case of requirement. Body mass index (BMI) of each case was calculated by measurements of the Same Physician instead of verbal expressions. Weight in kilograms is divided by height in meters squared (6). Office BP were checked after a 5-minute of rest in seated position with mercury sphygmomanometer. Cases with an overnight FPG level of 126 mg/dL or higher on two occasions were defined as diabetics. An oral glucose tolerance test with 75-gram glucose was performed in cases with a FPG level between 110 and 125 mg/dL, and diagnosis of cases with a 2-hour plasma glucose level of 200 mg/dL or greater is DM (6). Eventually, all smokers were collected into the first, and age and sex-matched non-smokers were collected into the second groups. Mean body weight, BMI, systolic and diastolic BP, triglycerides, LDL, HDL, FPG, ESR, CRP, and hematocrit values and prevalences of DM were detected in each group, and compared in between. Mann-Whitney U test, Independent-Samples T test, and comparison of proportions were used as the methods of statistical analyses.

Results

The study included 247 smokers (74 females and 173 males) and 167 non-smokers (55 females and 112 males). Interestingly, the mean age of the smokers was 46.2 years, and 70.0% of them were males. Although the mean body weight, BMI, systolic and diastolic BP, and hematocrit values were similar in both groups, mean triglycerides (163.1 versus 151.3 mg/dL, $p<0.05$), LDL (123.8 versus 117.5 mg/dL, $p<0.05$), ESR (10.6 versus 9.3 mm/h, $p<0.05$), and CRP values (2.3 versus 2.0 mg/L, $p<0.05$) were all higher in the smokers, significantly. On the other hand, mean HDL (40.9 versus 44.0 mg/dL, $p<0.05$) and FPG values (102.3 versus 111.6 mg/dL, $p=0.007$) and prevalences of DM (8.9% versus 14.3%, $p<0.05$) were lower in the smokers, significantly (Table 1). The smokers had a mean smoking history of 20.5 ± 15.0 (1-100) pack years.

Table 1: Comparison of smokers and non-smokers

| Variables | Smokers | p-value | Non-smokers |
|------------------------------|-------------------------------|---------|------------------------------|
| Number | 247 | | 167 |
| <u>Male ratio</u> | <u>70.0% (173)</u> | Ns* | 67.0% (112) |
| Mean age (year) | 46.2 ± 13.4 (19-76) | Ns | 44.8 ± 15.7 (13-77) |
| Weight (kg) | 76.1 ± 13.8 (44-118) | Ns | 74.7 ± 13.0 (45-122) |
| BMI† (kg/m²) | 26.6 ± 4.4 (16.2-39.4) | Ns | 26.5 ± 4.5 (16.6-41.1) |
| Systolic BP‡ (mmHg) | 127.5 ± 23.7 (80-200) | Ns | 130.0 ± 22.6 (80-200) |
| Diastolic BP (mmHg) | 88.0 ± 12.4 (60-130) | Ns | 88.5 ± 11.9 (60-130) |
| <u>Triglycerides (mg/dL)</u> | <u>163.1 ± 101.4 (40-585)</u> | <0.05 | <u>151.3 ± 86.2 (20-410)</u> |
| <u>LDL§ (mg/dL)</u> | <u>123.8 ± 34.3 (10-282)</u> | <0.05 | <u>117.5 ± 29.0 (43-185)</u> |
| <u>HDL (mg/dL)</u> | <u>40.9 ± 9.6 (26-70)</u> | <0.05 | <u>44.0 ± 9.4 (24-70)</u> |
| <u>FPG** (mg/dL)</u> | <u>102.3 ± 25.5 (70-309)</u> | 0.007 | <u>111.6 ± 37.6 (74-327)</u> |
| <u>ESR*** (mm/h)</u> | <u>10.6 ± 10.2 (1-51)</u> | <0.05 | <u>9.3 ± 8.0 (1-35)</u> |
| <u>CRP**** (mg/L)</u> | <u>2.3 ± 2.6 (0-13)</u> | <0.05 | <u>2.0 ± 2.5 (0-12)</u> |
| Hematocrit (%) | 41.9 ± 4.6 (28-60) | Ns | 41.0 ± 3.7 (31-49) |
| <u>DM*****</u> | <u>8.9% (22)</u> | <0.05 | <u>14.3% (24)</u> |

*Nonsignificant (p>0.05) †Body mass index ‡Blood pressures §Low density lipoproteins ||High density lipoproteins **Fasting plasma glucose ***Erythrocyte sedimentation rate ****C-reactive protein

*****Diabetes mellitus

Discussion

Excess weight may be the most common cause of vasculitis all over the world. Obesity may be one of the terminal consequences of the metabolic syndrome. It usually starts to develop just after infancy (7), and after such a long period of development, pharmaceutical and nonpharmaceutical approaches provide transient benefits either to heal obesity or to prevent its complications. Excess weight may cause a chronic low-grade inflammation on vascular endothelium, and risk of death from all causes including cardiovascular diseases and cancers increases parallel to the range of excess weight in all age groups (8). The chronic low-grade inflammation may cause genetic changes on the endothelial cells, and additionally the systemic atherosclerotic process may even decrease clearance of the malignant cells. The effects of excess weight on the BP were shown in the medical literature, extensively (9). For instance, incidence of sustained normotension (NT) was higher in the underweight (80.3%) than the normal weight (64.0%, p<0.05) and overweight groups (31.5%, p<0.05), and 52.8% of patients with HT had obesity against 14.5% of patients with the sustained NT (p<0.001) (10). So the dominant underlying cause of the metabolic syndrome appears as gaining weight, which may be the main cause of insulin resistance, hyperlipoproteinemias, impaired fasting glucose, impaired glucose tolerance, and white coat hypertension (WCH) via the prolonged low-grade inflammation on vascular endothelium in whole body (11). Prevention of the weight gain with physical activity, even in the absence of a prominent weight loss, will probably result with resolution of many parameters of the metabolic syndrome (12-15). According to our experiences, excess weight may actually be a consequence of physical inactivity instead of an

excessive eating habit, thus prevention of weight gain can not be achieved by diet alone (16). Additionally, limitation of excess weight as an excessive fat tissue around the abdomen under the heading of abdominal obesity is meaningless. Actually, it should be defined as overweight or obesity via the BMI since adipocytes function as an endocrine organ, and they release leptin, tumour necrosis factor (TNF)-alpha, plasminogen activator inhibitor-1, and adiponectin-like cytokines into the plasma (17). The eventual hyperactivities of sympathetic nervous system and renin-angiotensin-aldosterone system are probably associated with chronic endothelial inflammation, insulin resistance, and elevated BP. Similarly, the Adult Treatment Panel III reported that although some people classified as overweight with larger muscular masses, most of them also have excessive fat tissue predisposing to the terminal consequences of the metabolic syndrome (6).

Smoking may be the second common cause of vasculitis all over the world. It is one of the major risk factors for the atherosclerotic end-organ insufficiencies (18). Its atherosclerotic effect is the most obvious in Buerger's disease. Buerger's disease is an obliterative vasculitis characterized by inflammatory changes in small and medium-sized arteries and veins, and it has never been reported in the absence of smoking. Beside the well-known atherosclerotic effects of smoking, some studies reported that smoking in human being and nicotine administration in animals are associated with lower BMI values (19). Some evidences revealed an increased energy expenditure during smoking both on rest and light physical activity (20), and nicotine supplied by patch after smoking cessation decreased caloric intake in a dose-related manner (21). According to an animal study, nicotine may lengthen

intermeal time, and simultaneously decrease amount of meal eaten (22). Additionally, the BMI seems to be the highest in the former, the lowest in the current, and medium in never smokers (23). Smoking may be associated with a postcessation weight gain, but evidences suggest that risk of the weight gain is the highest during the first year after quitting, and decreases with the following years (24). Interestingly, the mean body weight and BMI were similar both in the smokers and non-smokers in the present study ($p>0.05$ for both). On the other hand, although the CHD was detected with similar prevalences in both genders, prevalences of smoking and COPD were higher in males against the higher BMI, LDL, triglycerides, WCH, HT, and DM in females (25). Beside that, the incidence of myocardial infarction is increased six-fold in women and three-fold in men who smoked at least 20 cigarettes per day (26). In another word, smoking may be more harmful for women about the atherosclerotic end-points probably due to the higher BMI and its consequences in them. Similarly, smoking is consistently higher in men in the literature (18). Several toxic substances found in cigarette smoke get into the circulation via the respiratory tract, and cause a vascular endothelial inflammation in all systems of the body. For example, smoking may even terminate with irritable bowel syndrome (IBS) and its consequences including chronic gastritis, hemorrhoids, and urolithiasis by means of several underlying mechanisms (27). First of all, smoking-induced vascular endothelial inflammation may disturb epithelial functions for absorption and excretion in the gastrointestinal and genitourinary tracts. These functional problems may terminate with the symptoms and components of the IBS including loose stool, diarrhea, constipation, and urolithiasis. Secondly, diarrheal losses-induced urinary changes may even cause urolithiasis (28, 29). Thirdly, smoking-induced sympathetic nervous system activation may cause motility disorders in the gastrointestinal and genitourinary tracts. Finally, immunosuppression secondary to smoking-induced vascular endothelial inflammation may even terminate with gastrointestinal and genitourinary tract infections causing loose stool, diarrhea, and urolithiasis since some types of bacteria can provoke urinary supersaturation, and modify the environment to form crystal deposits in the urine. In fact, 10% of urinary stones are struvite stones which are built by magnesium ammonium phosphate produced during infection with bacteria that possess the urease. Similarly, urolithiasis was detected in 17.9% of cases with the IBS, whereas this ratio was just 11.6% in cases without the IBS ($p<0.01$) (28).

Alcohol may be the third common cause of vasculitis all over the world. It is addictive to humans, and can result in alcohol use disorder (AUD), dependence, and withdrawal. Alcohol is the most dangerous drug, and the only drug that mostly damaged the others. It is causally linked to more than 200 different diseases and injuries (30). For instance, people hospitalized with AUD have an average life expectancy of 47-53 years in men and 50-58 years in women (31). In another definition, they die 24-28 years earlier than the general population (31). People with AUD have three-fold higher mortality in men and four-fold higher mortality in women (32). A very substantial part

of the Danish excess mortality and lower life expectancy compared to Sweden can be attributed to higher mortality related to alcohol consumption (8). Women are generally more sensitive to the harmful effects of alcohol, primarily due to the lower body weight, lower capacity to metabolize alcohol, and higher body fat. Alcohol can damage the liver and brain, and it is one of the major leading causes of cancers all over the world (30). Continued alcohol consumption leads to cell death in liver, scarring, cirrhosis, and hepatocellular carcinoma. Prolonged heavy consumption may even cause permanent brain damage. Alcohol may even cause loss of consciousness and rapid death in high amount. Hepatic alcohol dehydrogenase is the main enzymatic system to metabolize alcohol that requires the cofactor nicotinamide adenine dinucleotide (NAD), and the products are acetaldehyde and reduced NAD. Normally, NAD is used to metabolize fats in the liver but alcohol competes with these fats for the use of NAD in drinkers. In another definition, prolonged exposure of alcohol means that fats accumulate in the liver, leading to the term of fatty liver. Acetaldehyde is subsequently metabolized by the aldehyde dehydrogenase into acetate which in turn is broken down into carbon dioxide and water. Ethanol is the only type of alcohol that is found in alcoholic beverages. Ethanol crosses biological membranes and blood-brain barrier via passive diffusion, easily. Alcohol works in the brain primarily by increasing the effects of the gamma aminobutyric acid. This is the major inhibitory neurotransmitter of the brain. Alcohol causes happiness and euphoria, decreases anxiety, increases sociability, and induces sedation, impairment of cognitive, memory, motor, and sensory functions, and terminates with generalized depression of the central nervous system. Drinking in pregnancy may terminate with fetal disorders, since ethanol is classified as a teratogen. Similarly, alcohol is a major contributing factor of elevated triglycerides in the plasma. Plasma triglycerides may be one of the most sensitive APR in the body (9). Although the cases with regular alcohol consumption were excluded, plasma triglycerides were higher in the smokers in the present study (163.1 versus 151.3 mg/dL, $p<0.05$), indicating the inflammatory effects of smoking in the human body.

The acute phase response occurs in case of infections, infarctions, foreign bodies, autoimmune disorders, allergies, neoplasms, traumas, or burn-like stresses of the body. Certain mediators known as APR are increased or decreased during the acute phase response (33, 34). These mediators are frequently used in the clinical practice as indicators of acute inflammation in the body. The terms of acute phase proteins and APR are usually used synonymously, although some APR are polypeptides rather than proteins. Plasma concentrations of the positive and negative APR increase or decrease during an acute phase response, respectively. The acute phase response is predominantly mediated by the pro-inflammatory cytokines including TNF- α , interleukin (IL)-1, and IL-6 secreted by immune cells. In case of inflammations, infections, or tissue damages, neutrophils and macrophages release such cytokines into the circulation. The liver and various organs respond to the cytokines by producing several positive APR.

Some of the well-known positive APR are ESR, CRP, fibrinogen, ferritin, procalcitonin, hepcidin, haptoglobin, ceruloplasmin, complement proteins, and serum amyloid A. CRP is responsible for activation of the complement pathway. Serum CRP rises rapidly, with a maximal concentration reached within two days, and falls quickly once the inflammations were resolved. Measurement of CRP is a useful indicator of inflammations in the body. It correlates with ESR, but not always sensitively. This is due to the ESR being largely dependent upon elevation of fibrinogen with a half-life of one week, approximately. Thus ESR remains higher for a longer period of time despite the removal of inflammatory or infectious stimulus in the body. Whereas CRP rises with a half-life of 6-8 hours rapidly, and then returns to normal in case of a successful treatment, quickly. On the other hand, productions of the negative APR are suppressed at the same time. Some of the well-known negative APR are albumin, transferrin, retinol-binding protein, antithrombin, transcortin, alpha-fetoprotein, and hemoglobin. The suppression of such negative APR is also used as an indicator of inflammations in the body. Suppression of the synthesis of such negative APR may actually be due to the protection of amino acids for the production of positive APR, sufficiently. As also observed in the present study, productions of HDL may also be suppressed in the liver during the acute phase responses (35). Similarly, triglycerides, DM, and CHD were higher in patients with plasma HDL values of lower than 40 mg/dL, significantly (35). So HDL may actually behave as negative and triglycerides behave as positive APR in the plasma. Similarly, the highest CHD of the group with HDL values of lower than 40 mg/dL can also be explained by the same hypothesis in the other study (9). Additionally, plasma triglycerides increased whereas HDL decreased during infections (36). On the other hand, a 10 mg/dL increase of plasma LDL values was associated with a 3% lower risk of hemorrhagic stroke in the other study (37). Similarly, the highest prevalences of HT and DM parallel to the increased values of LDL and HDL, and the highest prevalences of COPD, CHD, and CRD in contrast to the lowest values of LDL and HDL may show initially positive but eventually negative behaviors of LDL and HDL as the APR (38). Interestingly, the most desired values were between 80 and 100 mg/dL for LDL, between 40 and 46 mg/dL for HDL, and lower than 60 mg/dL for triglycerides in the plasma (9). The increased plasma LDL, parallel to the triglycerides, ESR, and CRP, in contrast to the decreased HDL and FPG may also be an indicator of the low-grade nature of smoking-induced inflammation in the present study. According to the above observations, if the smoking-induced inflammation has been severe enough, plasma LDL values had been suppressed, too. In another definition, HDL and FPG may be more sensitive than LDL for suppression in the acute phase response.

Lower HDL values should alert physicians about searching of additional inflammatory pathologies (39-41). Normally, HDL may show various anti-atherogenic properties including reverse cholesterol transport and anti-oxidative and anti-inflammatory properties (40). However, HDL may become 'dysfunctional' in pathologic conditions in which relative compositions of lipids and proteins, as well

as the enzymatic activities of HDL are altered (40). For example, properties of HDL are compromised in patients with DM via the oxidative modification, glycation, or transformation of HDL proteomes into proinflammatory proteins. Additionally, the drugs increasing HDL values in the plasma such as niacin, fibrates, and cholesteryl ester transfer protein inhibitors did not reduce all cause mortality, CHD mortality, myocardial infarction, and stroke (42). In other definition, HDL may just be indicators instead of being the main actors of the human health. Similarly, BMI, DM, and CHD were the lowest between the HDL values of 40 and 46 mg/dL, and the prevalence of DM was only 3.1% between these values against 22.2% outside these limits (43). Similar to the present study, FPG and HDL were also suppressed in sickle cell diseases (SCD), probably due to the severe inflammatory nature of such diseases (44). Smoking may reduce HDL due to the systemic inflammatory effects on vascular endothelium. On the other hand, plasma triglycerides are the only lipids those are not suppressed in pathological weight losses (45). For example, plasma triglycerides were not decreased, instead increased in contrast to the suppressed body weight and BMI in the SCD (45). Similarly, prevalences of excess weight, DM, HT, and smoking were all higher in the hypertriglyceridemia group (200 mg/dL and higher) (46). On the other hand, the greatest number of deteriorations in the metabolic parameters was observed just above the plasma triglycerides value of 60 mg/dL (47).

The body's homeostatic mechanism keeps blood glucose levels within a narrow range. There are two groups of mutually antagonistic hormones affecting the blood glucose levels. Glucagon, cortisol, and catecholamines are the catabolic hormones increasing the blood glucose, whereas insulin is the anabolic hormone decreasing the blood glucose levels. Glucagon is secreted from the alpha cells, while insulin is secreted from the beta cells of pancreatic islets which are the bundles of endocrine tissues. They regulate the blood glucose levels together through a negative feedback mechanism. When the blood glucose level is too high, insulin tells muscles to take up excess glucose for storage. When the blood glucose level is too low, glucagon informs the tissues to produce more glucose. Glucagon and insulin are secreted into the portal vein, and extracted from the portal vein by the liver. Epinephrine prepares the muscles and respiratory system for a 'fight to fight' response. Cortisol prepares the body for the stresses. Glucose is stored in the skeletal muscles and hepatocytes in the form of glycogen. There are approximately 100 and 400 grams of glycogen stored in the skeletal muscles and liver in the human body, respectively (48). A blood glucose level of four grams, or about a teaspoon, is critical for the normal function of millions of cells in the body (48). The brain consumes about 60% of the blood glucose in fasting. The four grams of glucose circulates in the blood stream of a person with a body weight of 70 kg. This amount is kept constant with a sophisticated control mechanism in the body. The constant blood glucose levels are maintained via the hepatic and muscular glycogen stores at fasting. FPG, which is measured after a fast of 8 hours, is the most commonly used indication of overall

glucose homeostasis. Infections, inflammations, surgical operations, depressions, alcohol, smoking, and various stresses may affect the blood glucose homeostasis. For example, smoking was negatively associated with FPG and type 2 DM in Chinese men of normal weight, but no significant association was found in men with excess weight or in women (49). On the other hand, smoking was positively associated with nonfatal stroke, particularly in patients with type 2 DM (49). Similarly, smokers have a lower likelihood of newly-diagnosed DM among Chinese males with a lower BMI (50). Parallel to the above results, mean FPG value (102.3 versus 111.6 mg/dL, $p=0.007$) and prevalence of DM (8.9% versus 14.3%, $p<0.05$) were also lower in the smokers in the present study.

As a conclusion, smoking may cause a low-grade systemic inflammation on vascular endothelium terminating with an accelerated atherosclerotic process-induced end-organ insufficiencies all over the body. Plasma triglycerides, LDL, ESR, and CRP may be positive whereas HDL and FPG may be negative APR indicating such inflammatory effects in the body.

References

1. Helvaci MR, Aydin Y, Gundogdu M. Smoking induced atherosclerosis in cancers. *HealthMED* 2012; 6(11): 3744-9.
2. Helvaci MR, Kaya H, Borazan A, Ozer C, Seyhanli M, Yalcin A. Metformin and parameters of physical health. *Intern Med* 2008; 47(8): 697-703.
3. Helvaci MR, Algin MC, Abyad A, Pocock L. Physical inactivity or an excessive eating habit. *Middle East J Nursing* 2018; 12(1): 14-8.
4. Eckel RH, Grundy SM, Zimmet PZ. The metabolic syndrome. *Lancet* 2005; 365(9468): 1415-28.
5. Helvaci MR, Ayyildiz O, Muftuoglu OE, Yaprak M, Abyad A, Pocock L. Aging syndrome. *World Family Med* 2017; 15(3): 39-42.
6. Third Report of the National Cholesterol Education Program (NCEP) Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults (Adult Treatment Panel III) final report. *Circulation* 2002; 106(25): 3143-421.
7. Helvaci MR, Tutanc M, Arica V. Metabolic deterioration just after infancy. *Middle East J Intern Med* 2013; 6(4): 26-30.
8. Juel K. Life expectancy and mortality in Denmark compared to Sweden. What is the effect of smoking and alcohol? *Ugeskr Laeger* 2008; 170(33): 2423-7.
9. Helvaci MR, Yapyak M, Tasci N, Abyad A, Pocock L. The most desired values of high and low density lipoproteins and triglycerides in the plasma. *World Family Med* 2020; 18(8): 21-7.
10. Calle EE, Thun MJ, Petrelli JM, Rodriguez C, Heath CW Jr. Body-mass index and mortality in a prospective cohort of U.S. adults. *N Engl J Med* 1999; 341(15): 1097-105.
11. Helvaci MR, Kaya H, Yalcin A, Kuvandik G. Prevalence of white coat hypertension in underweight and overweight subjects. *Int Heart J* 2007; 48(5): 605-13.
12. Helvaci MR, Kaya H, Duru M, Yalcin A. What is the relationship between white coat hypertension and dyslipidemia? *Int Heart J* 2008; 49(1): 87-93.
13. Franklin SS, Barboza MG, Pio JR, Wong ND. Blood pressure categories, hypertensive subtypes, and the metabolic syndrome. *J Hypertens* 2006; 24(10): 2009-16.
14. Azadbakht L, Mirmiran P, Esmailzadeh A, Azizi T, Azizi F. Beneficial effects of a Dietary Approaches to Stop Hypertension eating plan on features of the metabolic syndrome. *Diabetes Care* 2005; 28(12): 2823-31.
15. Helvaci MR, Ayyildiz O, Gundogdu M, Aydin Y, Abyad A, Pocock L. Excess weight or smoking. *World Family Med* 2018; 16(10): 14-9.
16. Helvaci MR, Ayyildiz O, Gundogdu M, Aydin Y, Abyad A, Pocock L. Body mass and blood pressure. *World Family Med* 2019; 17(1): 36-40.
17. Funahashi T, Nakamura T, Shimomura I, Maeda K, Kuriyama H, Takahashi M, et al. Role of adipocytokines on the pathogenesis of atherosclerosis in visceral obesity. *Intern Med* 1999; 38(2): 202-6.
18. Fodor JG, Tzerovska R, Dorner T, Rieder A. Do we diagnose and treat coronary heart disease differently in men and women? *Wien Med Wochenschr* 2004; 154(17-18): 423-5.
19. Grunberg NE, Greenwood MR, Collins F, Epstein LH, Hatsukami D, Niaura R, et al. National working conference on smoking and body weight. Task Force 1: Mechanisms relevant to the relations between cigarette smoking and body weight. *Health Psychol* 1992; 11: 4-9.
20. Walker JF, Collins LC, Rowell PP, Goldsmith LJ, Moffatt RJ, Stamford BA. The effect of smoking on energy expenditure and plasma catecholamine and nicotine levels during light physical activity. *Nicotine Tob Res* 1999; 1(4): 365-70.
21. Hughes JR, Hatsukami DK. Effects of three doses of transdermal nicotine on post-cessation eating, hunger and weight. *J Subst Abuse* 1997; 9: 151-9.
22. Miyata G, Meguid MM, Varma M, Fetissov SO, Kim HJ. Nicotine alters the usual reciprocity between meal size and meal number in female rat. *Physiol Behav* 2001; 74(1-2): 169-76.
23. Laaksonen M, Rahkonen O, Prattala R. Smoking status and relative weight by educational level in Finland, 1978-1995. *Prev Med* 1998; 27(3): 431-7.
24. Froom P, Melamed S, Benbassat J. Smoking cessation and weight gain. *J Fam Pract* 1998; 46(6): 460-4.
25. Helvaci MR, Kaya H, Gundogdu M. Gender differences in coronary heart disease in Turkey. *Pak J Med Sci* 2012; 28(1): 40-4.
26. Prescott E, Hippe M, Schnohr P, Hein HO, Vestbo J. Smoking and risk of myocardial infarction in women and men: longitudinal population study. *BMJ* 1998; 316(7137): 1043-7.

27. Helvacı MR, Dede G, Yildirim Y, Salaz S, Abyad A, Pocock L. Smoking may even cause irritable bowel syndrome. *World Family Med* 2019; 17(3): 28-33.
28. Helvacı MR, Kabay S, Gulcan E. A physiologic events' cascade, irritable bowel syndrome, may even terminate with urolithiasis. *J Health Sci* 2006; 52(4): 478-81.
29. Helvacı MR, Algin MC, Kaya H. Irritable bowel syndrome and chronic gastritis, hemorrhoid, urolithiasis. *Eurasian J Med* 2009; 41(3): 158-61.
30. Rehm J. Alcohol and mortality. *Alcohol Res* 2014; 35(2): 174-83.
31. Westman J, Wahlbeck K, Laursen TM, Gissler M, Nordentoft M, Hällgren J, et al. Mortality and life expectancy of people with alcohol use disorder in Denmark, Finland, and Sweden. *Acta Psychiatr Scand* 2015; 131(4): 297-306.
32. Roerecke M, Rehm J. Alcohol use disorders and mortality: a systematic review and meta-analysis. *Addiction* 2013; 108(9): 1562-78.
33. Gabay C, Kushner I. Acute-phase proteins and other systemic responses to inflammation. *N Engl J Med* 1999; 340(6): 448-54.
34. Wool GD, Reardon CA. The influence of acute phase proteins on murine atherosclerosis. *Curr Drug Targets* 2007; 8(11): 1203-14.
35. Helvacı MR, Abyad A, Pocock L. High and low density lipoproteins may be negative acute phase proteins of the metabolic syndrome. *Middle East J Nursing* 2020; 14(1): 10-6.
36. Pirillo A, Catapano AL, Norata GD. HDL in infectious diseases and sepsis. *Handb Exp Pharmacol* 2015; 224: 483-508.
37. Ma C, Na M, Neumann S, Gao X. Low-density lipoprotein cholesterol and risk of hemorrhagic stroke: a systematic review and dose-response meta-analysis of prospective studies. *Curr Atheroscler Rep* 2019; 21(12): 52.
38. Helvacı MR, Abyad A, Pocock L. The safest values of low density lipoproteins in the plasma. *World Family Med* 2020; 18(4): 18-24.
39. Toth PP. Cardiology patient page. The "good cholesterol": high-density lipoprotein. *Circulation* 2005; 111(5): 89-91.
40. Femlak M, Gluba-Brzózka A, Cialkowska-Rysz A, Rysz J. The role and function of HDL in patients with diabetes mellitus and the related cardiovascular risk. *Lipids Health Dis* 2017; 16(1): 207.
41. Ertek S. High-density lipoprotein (HDL) dysfunction and the future of HDL. *Curr Vasc Pharmacol* 2018; 16(5): 490-498.
42. Keene D, Price C, Shun-Shin MJ, Francis DP. Effect on cardiovascular risk of high density lipoprotein targeted drug treatments niacin, fibrates, and CETP inhibitors: meta-analysis of randomised controlled trials including 117,411 patients. *BMJ* 2014; 349: 4379.
43. Helvacı MR, Abyad A, Pocock L. What a low prevalence of diabetes mellitus between the most desired values of high density lipoproteins in the plasma. *World Family Med* 2020; 18(7): 25-31.
44. Helvacı MR, Altintas E, Yalcin A, Muftuoglu OE, Abyad A, Pocock L. Positive and negative acute phase reactants in sickle cell diseases. *World Family Med* 2022; 20(3): 36-42.
45. Helvacı MR, Salaz S, Yalcin A, Muftuoglu OE, Abyad A, Pocock L. Cholesterol may be a negative whereas triglycerides positive acute phase reactants in the plasma. *Asclepius Med Res Rev* 2021; 4(1): 1-8.
46. Helvacı MR, Aydin LY, Maden E, Aydin Y. What is the relationship between hypertriglyceridemia and smoking? *Middle East J Age and Ageing* 2011; 8(6).
47. Helvacı MR, Abyad A, Pocock L. The safest upper limit of triglycerides in the plasma. *World Family Med* 2020; 18(1): 16-22.
48. Wasserman DH. Four grams of glucose. *Am J Physiol Endocrinol Metab* 2009; 296(1): E11-21.
49. Wang S, Chen J, Wang Y, Yang Y, Zhang D, Liu C, et al. Cigarette smoking is negatively associated with the prevalence of type 2 diabetes in middle-aged men with normal weight but positively associated with stroke in men. *J Diabetes Res* 2019; 1853018.
50. Hou X, Qiu J, Chen P, Lu J, Ma X, Lu J, et al. Cigarette smoking is associated with a lower prevalence of newly diagnosed diabetes screened by OGTT than non-smoking in Chinese Men with normal weight. *PLoS One* 2016; 11(3): e0149234.

EFFECTUAL COMMUNICATION AND EXPLANATION IN DERMATOLOGY

Ebtisam Elghblawi

Correspondence:

Dr Ebtisam Elghblawi

Dermatologist

Email: ebtisamya@yahoo.com

Received: May 2022; Accepted: June 2022; Published: July 2022

Citation: Elghblawi E. Effectual communication and explanation in dermatology. Middle East Journal of Nursing 2022; 16(2): 49 - 52. DOI: 10.5742/MEJN2021.9378027

Abstract

This article aims to present a doctor-patient relationship using a reflective Gibb's model (learning by concept). Reflective practice can help us progress in our career and if done properly in a structured manner, it can help improve our skills. Being a dermatology doctor for many years with profound experience gave me the insights and the privileges, to spot dermatology patients' main issues and concerns to address them attentively. Using the reflective process enabled me to explore my feelings and the experience, in discussing personal issues with this young lady I am presenting. I used the Gibb's six-stage reflective model to understand how this young lady was feeling for a quite long time with a hole in her chin. This can be used to answer specific, patient-orientated questions that arise recurrently in real-life practice

I will use a nickname; Erynas, to anonymise and comply with confidentiality, without stating the location, timing and date, to identify my patient and present her case.

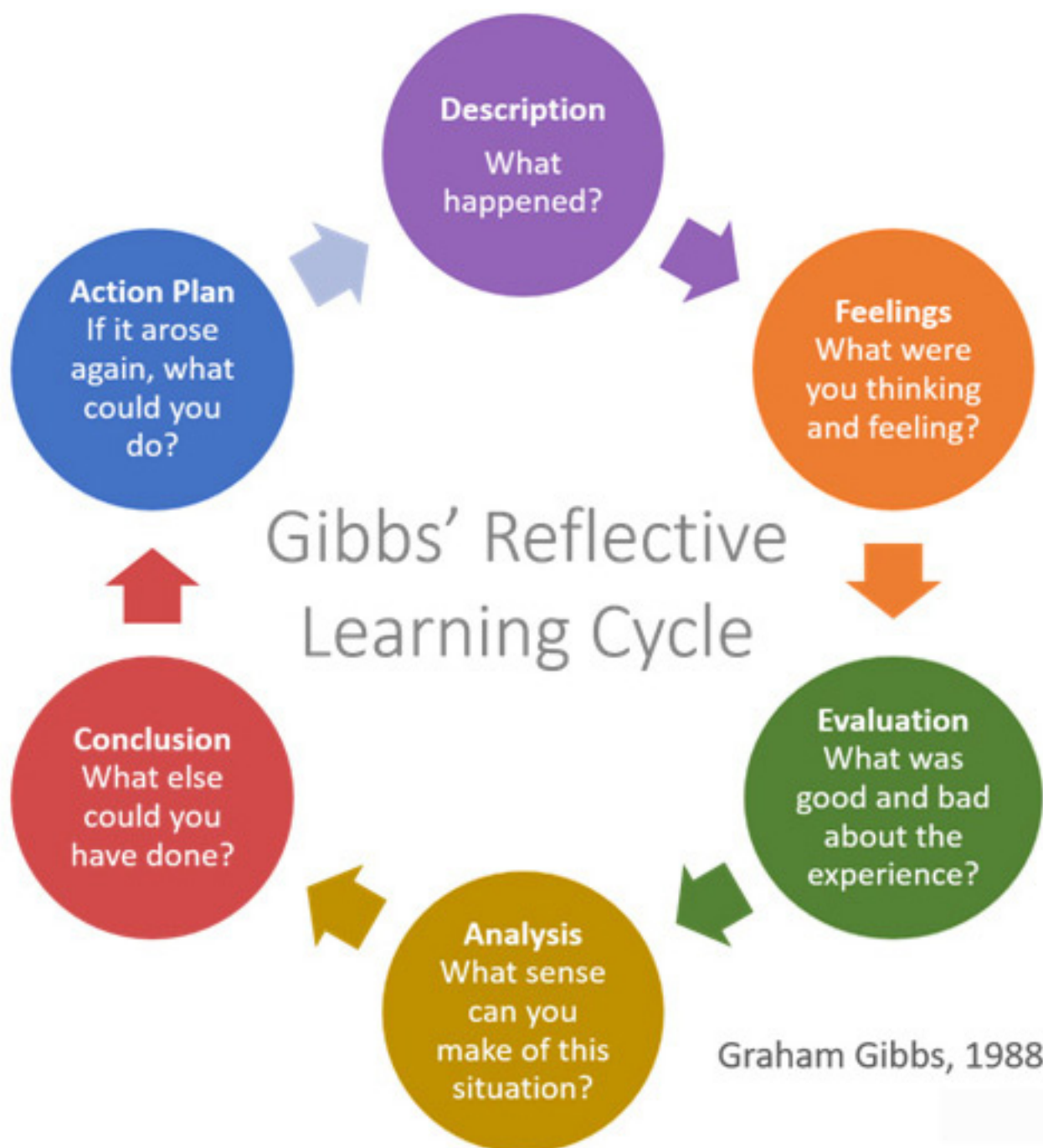
Keywords: Reflection, reflective process, career, skills.

Reflection is a solo cyclical process and it can take time. It is meant to grow and adapt. Thus, better to apply it momentarily at the spot(1-2). It is a subconscious process of reflection basically about your whole life. In other words, what didn't work once, we will try to avoid next time due to the experience lived and encountered(3). It is about applying theoretical knowledge into a practice and unleashing our strengths and weaknesses(3).

By reflecting, I am challenging my own beliefs and values to fulfil myself and develop professionally and benefit my patients. Also, it's about why I am doing this and how it works by seeing its validity and being open to myself and learning by asking for feedback and seeing how this practice will align with the research and the sources done

in this area; then adopting and adjusting according to a particular context, as there is no right or wrong answer. In short, it is learning, reflecting, action and implementation. It is not a simple process as it can takes ages to get it right eventually.

Reflective model, has always been used in order, to learn and improve clinical skills, practice, and to gain new insights. It is meant to be used in the back time retrospectively, to explore understanding and the whole experience. The Gibb's six stages reflect a set of emotional feelings and how they are to be used, to tackle the issue underpinning the clinical setting(4). It's basically about breaking down the whole issue, to help make sense, to shape future practice with effective approach.



Description of the events:

Erynas consulted me about a long-standing hole in her chin, and she wasn't aware of the reason for these ongoing issues on her face, for many years, despite seeking different medical advice. She was embarrassed to be seen with that hole, and avoided social interactions due to this. She also, explained her worry for future marriage with this. I asked her what was her main concerns and her thoughts about the whole thing. She wasn't sure but emphasised the real need to get rid of it. I reassured her and listened to her attentively and probing gently her main concerns, but was wondering what might be the real causation. I asked if she did any self-medication and she expressed that she tried many OTC topicals to alleviate this matter, but none seemed to work. I felt for her and was keen to help her. I consented to examine her thoroughly and she agreed. I planned to give her a local antiseptic just to keep it sterile and to dry the oozing fluid.

Reflection on feelings:

Erynas was one of the females I encountered and she was deeply impacted by this hole in her chin. I was confident I could explain what might be the reason for this deep hole. I felt sympathy for her long-term issue and felt emotional and motivated to help her by discussing what might be the cause for this and what solutions can be taken forward. There were many things going in the back of my head. So, I decided to dig deep and explore different reasonings I have at the top of my mind and see how it goes. I asked about any local trauma, infection and dental abscess which she denied firmly. I asked about her medical conditions and explored any chronic or pre-existing issues.

With this in mind, I took the opportunity to ask her to be seen by a dentist and recommended and justified an OBJ x-ray which will explore her dental situation in one go. She agreed and stated that she will come back to me once all was done, with answers and explanations.

Evaluation:

I asked myself what went well and what went bad?

As I have had a lot of experience in dermatology and I have had many exposures to different cases I was able to use my past rich experience to come up with an approach for Erynas to solve and sort out her long-term chin problem. In fact, I felt very confident in guiding through this young lady's chin issue. Luckily her mood was elevated and not impacted at all by this. I decided to explain her possible underlying causes and put a management plan for her. Despite the fact that I had never seen this in reality, I did study a similar thing in textbooks years back in medical school. So, I was self-assured enough to know what it might be, but needed some more evidence and back-up to my claim. Luckily Erynas' mood was fine and not low. She was totally cooperative and deciding to take this further step. Actually, I gave her the necessary knowledge, skills, and confidence to manage this hole in her chin. In fact, I feel privileged that I empowered the young lady to solve it herself. I was pleased to see that and was keen to see positive outcomes.

Critical analysis:

Facial skin lesions can have a profound impact in any one's quality of life and wellbeing. I considered the choices carefully and wisely, and told her to seek a dentist's help from my perspective of her problem after asking the relevant questions and after probing her main concerns. Was that easy or difficult to state? Was it bad or good? It could be the lack of knowledge in her condition where she kept living with this hole for many years without finding the right answer and help. She might have given up already. I also, realised that improved communication, gaining trust and delivering the needed knowledge could shape the desired outcome. I also learnt deficient knowledge can be the leading cause for such a thing to be left without solving the problem. Also, good concordance is a necessity for an effective remedy. I also, learnt that discussing things openly would help alleviate any anxiety and worries. Also, I learnt that she had worries and fears about this and didn't know how to address them properly previously. I also learned, that psychosocial matters are very vital in anyone for a speedy recovery and improvement. I had enjoyed much this case and hoped she will come back for updates as she promised and I emphasised. I know that in dermatology, there aren't many treatments as a quick fix, but a gentle approach can invest in the future and can be rewarding. Self-assessment is valued when used seriously for listing self-strengths and self-weakness features, and can be a normal part of our development and learning process. Additionally, silent reflection can be a powerful tool to improve. It is no wonder we develop competence in specific situations that mandate effective communication skills(5-7).

Synthesis and conclusion:

What could I do if faced with the same situation again; what would I do differently? What is working well and what is not working well, how and why? What was the struggle I am facing and why? And how can I overcome it. How can I gain a new skill and strengthen it?

This case reflects an interaction between myself and Erynas regarding a long-term hole in her chin. I had assessed her holistically.

This is the first time I used the Gibbs reflective model. This gave me a positive experience to learn how I can tackle issues with young people and take them gently forward. Young people have different needs and expectations. Sometimes, we need a one fit and for all, approach to deliver the needed care with agreeing on an acceptable management plan even if it is going to take time.

Action plan:

By reflection, I explore, and challenge myself and my potential, and identify questions and find answers. Self-examination develops my strengths and weakness and acknowledges my fears and ideas, and makes me develop and improve professionally and practically. It is basically

about how to improve my practice going forward and what I learnt from the clinical case scenario I encountered.

I want to add that I never received any curriculum about reflection in my medical studies and neither did most of my peers. But I guess on reading some papers I found that reflection shapes our further actions and make us a better doctor, by knowing, exploring and learning about our self deeply and challenging our strengths and weakness, to create meaningful learning(9,10). It is basically about the act of bending back in time from an incident and looking into the mirror, with mental cognition to conceptualise the event and the performance that happened at that moment and to refine it and recognise the deficiency in knowledge, skills and attitudes to mitigate and improve(10). In simple terms, its self-conversation(11).

In this case scenario, I realised that I have a good comfortable communication skill, with Erynas as she opened up with me and was cooperative. My strengths always lie in talking to patients, and this specialty makes the most of those skills, as i will have the opportunity to listen and reflect back to understand patients' main worries and concerns. That being said, I enjoy this specialty and find it rewarding on many levels, as a career and from putting myself in my patient's shoes. In addition, I value having my say in the direction and content of the issue being raised. I will hone those skills more by observing the work in the NHS to develop more professionally. Additionally, I love how the skin manifestations are clearly seen and visualised in specific ways leading to identification.

In short, I meant spending time exploring in-depth the areas underlying, which I find interesting and asking colleagues their perceptions and learning from their experience as well. Also, it would make sense to follow the principle of 5Rs checklists, if anyone is new to the reflection concept, namely – reacting, recording, reviewing, revising, reworking and reassessing(6). By doing this, I was demonstrating professional conduct to maintain a good medical practice by showing the ability to learn from and develop my own system of self-learning and practice to improve my skills and where care could have been better delivered.

I also learnt, that a good trusting relationship is paramount to achieve any effective remedy. I also have a passion for research work which will make me a better doctor and being a doctor makes a better researcher. This will give protected time to think and learn momentarily.

I also found a paper about reflection in medicine and I think I liked the term professional competence for the following expression, “the habitual and judicious use of communication, knowledge, technical skills, clinical reasoning, emotions, values, and reflection in daily practice for the benefit of the individuals and communities being served” (8). After all, reflection can feed a foundation for building learning activities that might help improve our reflective abilities(8).

I will disseminate this to peers, as the sharing of knowledge is a fundamental part of any dermatology case in a holistic approach. Also, I will continue to read and reflect my clinical practice, any encounter in life, such as reading, on a daily basis. Also, creating new action plans that identify my learning requirements will address my limitations and by acknowledging them I will generate achievable goals to become a proficient practitioner. Finally, change will happen with reflection to improve.

References:

1. Schon, D. (1983). *The Reflective Practitioner: How Professionals Think In Action*. Basis Books.
2. Boud,D., Keogh,R. & Walker, D. (1985) *Reflection: Turning Experience into Learning*. London: Kogan Page.
3. Koshy K, Limb C, Gundogan B, Whitehurst K, Jafree DJ. Reflective practice in health care and how to reflect effectively. *Int J Surg Oncol (N Y)*. 2017;2(6):e20. doi:10.1097/IJ9.0000000000000020
4. Gibbs G. *Learning by doing: a guide to teaching and learning methods*, Oxford (1988). FE Unit Oxford Polytechnic.
5. Boyd, E.M. & Fales, A.W. (1983) Reflective learning: Key to learning from experience. *Journal of Humanistic Psychology*, 23 (2), 99 -117.
6. Cooper A. Reflection in practice: Communication with a teenager. *Dermatological Nursing* (2018). 17(1): 9-12.
7. *Getting started with reflective practice*, Cambridge international education teaching and learning team, <https://www.cambridge-community.org.uk/professional-development/gswrp/index.html>.
8. Ménard L, Ratnapalan S. Teaching moment: reflection in medicine: models and application. *Can Fam Physician*. 2013;59(1):105-e59.
9. Haber J. Reflecting on reflection. *Acad Emerg Med*. 2013 Jan;20(1):114. doi: 10.1111/acem.12047. PMID: 23570489.
10. Bernard AW, Gorgas D, Greenberger S, Jacques A, Khandelwal S. The use of reflection in emergency medicine education. *Acad Emerg Med*. 2012 Aug;19(8):978-82. doi: 10.1111/j.1553-2712.2012.01407.x. Epub 2012 Jul 20. PMID: 22818356.
11. Okuda R, Fukada M. Changes resulting from reflection dialogues on nursing practice. *Yonago Acta Med*. 2014 Mar;57(1):15-22. Epub 2014 Apr 28. PMID: 25067874; PMCID: PMC4110690.