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Table of Contents

Benghazi University Medical journal
Faculty of Medicine, University of Benghazi
VOLMUE:2 ISSUE:1 June: 2025 BUMJ

Welcome from the Editor-in-Chief

The Benghazi University Medical Journal (BUMJ) is a semi-annual, open-access publication that follows a rigorous double-blind, peer-review process. We publish original research, insightful reviews, intriguing case reports, and brief communications that highlight the latest advancements in diagnosis, treatment, and other health-related fields. BUMJ also welcomes correspondence about its published articles to encourage academic dialogue and the exchange of ideas.

Our mission is to be a platform for sharing innovative research, thought-provoking reviews, and impactful case studies. We strive to bridge the gap between research and clinical practice by promoting evidence-based approaches and covering a wide range of topics—such as basic medical sciences, cutting-edge diagnostics, therapeutic innovations, healthcare technologies, and interdisciplinary patient care.

At BUMJ, we are passionate about advancing healthcare and improving outcomes. We invite contributions from diverse voices in the medical community and look forward to fostering meaningful collaborations that make a difference.

Prof. Amina A. Alshekteria

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The Preconception Diet and Folic Acid Intake in a Post-Conflict Setting: Insights from Private Clinics in Benghazi, Libya

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Original Research Article

Abstract

Background: Maternal nutrition during the preconception period is crucial for fetal development and pregnancy outcomes.

Aim: This study aims to assess the dietary intake and folic acid (FA) consumption among pregnant women in Benghazi, Libya, following eight years of political instability.

Method: A cross-sectional study was conducted with 74 first-trimester pregnant women attending private antenatal clinics between February and June 2019. Dietary intake was evaluated using the European Prospective Investigation into Cancer and Nutrition Food Frequency Questionnaire (EPIC-FFQ), adapted for the Libyan population, and analyzed using the food frequency questionnaire European prospective investigation into cancer and
nutrition tool for analysis (FETA).

Results: The analysis revealed diets high in energy but deficient in essential nutrients. Only 26% of women-initiated FA supplementation before pregnancy, while 16% did not consume FA at all. The mean fiber intake 15.05 g/day was significantly lower than recommended $p < 0.001$. Micronutrient deficiencies were observed in iron and folate, while vitamin A intake was excessive. Additionally, 43% of participants were overweight or obese before pregnancy. Socioeconomic factors, including low employment rates 30% and limited household income 54% ≤1000 Libyan Dinar/month, likely contributed to these nutritional challenges.

Conclusion: Pregnant women in Benghazi exhibit dietary inadequacies, particularly low fiber, iron, and folate intake, and insufficient pre-conceptional folic acid use, highlighting nutritional vulnerabilities in this conflict-affected area.

Keywords: Periconceptional, Dietary intake, Folic acid supplement, Conflict, Libya Benghazi.

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Introduction

The periconceptional period represents a pivotal timeframe for human development, wherein both maternal and paternal physiological factors can significantly influence the health outcomes of offspring. The nutritional status of pregnant women during this critical window is paramount, as a diet rich in essential nutrients not only supports maternal health but also fosters optimal fetal development, with implications extending into the long term (1,2). Research consistently indicates that inadequate maternal nutrition correlates with a range of adverse pregnancy outcomes, including intrauterine growth restriction, low birth weight, preterm birth, stunting, and increased maternal and fetal mortality (3). Notably, studies have demonstrated that women adhering to healthier dietary patterns experience improved pregnancy outcomes, even when accounting for pre-existing health issues and weight considerations (4,5). In addition to immediate effects, the lifestyle choices of parents during the preconception period can have lasting repercussions on the health of their children, potentially elevating the risk of various chronic diseases through complex biological mechanisms, including epigenetic modifications and metabolic alterations (6–8). The role of micronutrient supplementation, particularly with folic acid (FA), vitamin D, and iron, has been linked to reduced risks of neural tube defects and adverse birth outcomes (9–11). Furthermore, maternal body mass index (BMI) is a crucial determinant of both immediate and long-term health outcomes for offspring, with studies revealing detrimental effects associated with both underweight and overweight maternal statuses (12–15).

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The ongoing conflict in Benghazi, Libya, since 2011, has profoundly disrupted the lives of its residents, particularly affecting pregnant women and their pregnancy outcomes (16). The conflict has led to the destabilization of food supply chains, economic hardship, and population displacement, which likely compromised the availability and affordability of nutritious foods and supplements essential for maternal health. During armed conflicts, women are particularly vulnerable to severe malnutrition, which can exacerbate risks of complications such as difficult labor, premature birth, low birth weight, and maternal mortality from severe anemia (17,18). Despite the critical importance of maternal nutrition and the adverse conditions faced by Libya in recent years, there remains a significant gap in understanding the dietary intake and supplement consumption among pregnant women in the region (19). Current data suggest that Libya has made limited progress in addressing diet-related health issues, including anemia and childhood stunting (20).

The aim of this study is to elucidate the dietary intake and folic acid supplementation practices during the first trimester of pregnancy among women in private clinics in Benghazi. The findings are anticipated to enhance comprehension of the nutritional needs of pregnant women in conflict-affected areas. By analyzing dietary habits and supplementation practices in Benghazi, Libya, the findings will inform evidence-based recommendations for policymakers and healthcare providers both local and worldwide in similar contexts. These insights will guide the development of effective interventions to

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address their unique needs and promote healthier pregnancies.

Subjects and Methods:

Sample selection and study design

This is a cross-sectional study and the data was collected from five private antenatal clinics; (Alom Alhanon, Al Nukhba, Al Madina, Eben Seena and Al Tarek clinic) in Benghazi city. The clinics were chosen based on their size and popularity as private women's health clinics within Benghazi to ensure we could reach a significant portion of the target population. This design allows for the collection of data from a diverse group of participants at a single point in time, facilitating a comprehensive analysis of nutritional practices in this specific population during the periconceptional time. Data were collected through structured interviews and questionnaires administered to participants recruited using a convenience sampling method. Trained female researchers conducted the interviews to ensure cultural sensitivity and respect local traditions. The inclusion criteria were females in their first trimester with no medical complications and agreed to enroll in the study were included.

Data collection and study tool

1.A questionnaire was developed by the research team to achieve the aims of this study. It was divided into three sections as follows:

2.Socio-demographic section: Contains questions on age, nationality, educational level, occupational status and family income. Included questions about pre pregnancy and current use of FA and multivitamins and anthropometric measurements (weight and height) pre pregnancy.

3.Dietary intake: A translated and adapted version of the EPIC -FFQ (21) was used to assess the dietary

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intake of the participants. This questionnaire is a validated tool designed to measure an individual's usual food consumption over the previous 12 months.

The questionnaire includes a list of 130 foods and asks participants to rate how often they consume each item. The frequency options range from never to multiple times per day. The serving sizes are specified in units, portions, or household measures. A standard portion size is used for all participants, regardless of their age or gender. EPIC-FFQ was adapted for the Libyan population. Foods frequently consumed in Libya and not available in the list was added (such as cuscus, dates, olives) while foods and beverages that are not consumed by the Libyan population were deleted, such as food contains pork and alcoholic beverages. Two bilingual experts in nutrition reviewed the final Arabic version of EPIC-FFQ. The questionnaire was transformed into digital format. To ensure data accuracy and reliability, field researchers underwent rigorous training in FFQ administration, portion size estimation, data entry, and ethical guidelines for data collection.

Data analysis:

Body mass index (BMI) was calculated using the standard formula: BMI = Weight (kg) / Height $(m)^2$. Participants were categorized into weight status groups: underweight (<18.5), normal weight (18.5-25), overweight (25-30), and obese (≥30). Dietary intake data, collected using the EPIC-FFQ, was analyzed using the FETA software (Mulligan et al. 2014). FETA is a specialized tool designed for analyzing dietary data from EPIC-FFQs. It was used to calculate the average daily intake of energy, macronutrients (car-

 ISSN: Online 3005-7450, ISSN:Link 3005-7442

https://www.journals.uob.edu.ly/BUMEJ DOI: https://doi.org/10.37376/benuivmedj.v1i2

bohydrates, proteins, and fats), and micronutrients (vitamins and minerals). Descriptive statistics: frequency (percentage), mean (± SD) and median (IQR), were used to summarize demographic, socioeconomic, and dietary intake data. Chi-square tests were employed to assess associations between FA supplementation and socio-demographic factors. Independent sample t-tests were used to compare fiber intake with the recommended amount of 14 g per 1000 kcal. One-sample t-tests were used to compare the mean intake of key vitamins and minerals with the recommended dietary intakes for pregnant women (22). Statistical significance was set at a p-value of <0.05. Data were analyzed using IBM SPSS Statistics version 26.

Ethical Considerations:

The University of Benghazi Review Board approved the study design. Before initiating recruitment, official letters were sent to the administrators of the selected private clinics in Benghazi, outlining the study's objectives and seeking their cooperation to facilitate participant enrollment. All potential participants who met the inclusion criteria were provided with a detailed information about the purpose of the study and the confidentiality measures followed by the research team. A written consent form in the Arabic language was signed by each participant. To ensure confidentiality, no personal identifiers were used on the survey forms and all collected data was anonymized and stored securely.

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https://www.journals.uob.edu.ly/BUMEJ DOI: https://doi.org/10.37376/benuivmedj.v1i2

Results:

From the 93 approached females, 74 pregnant females fulfilled the inclusion criteria and agreed to be enroll in the study (80% response rate). Half of the participants were recruited from the Alom Alhanon clinic, 24% were recruited from Al Nukhba clinic and 25% were recruited from the other clinics. All participants (n = 74) provided complete data for all variables of interest. The age ranged from 17 to 40 years with a mean of 28 years (SD 5.3). All participants were married for a period ranging from 3 months to 16 years, 58% held university degrees or higher. Thirty percent of them had jobs, while the rest were housewives. Fifty seven percent of the husbands were employed, while the rest being self-employed. The family income of 54% of the participants was 1000 LD (approximately $220) or less. The majority of respondents (82%) reported that husbands were the primary earners in the household, while 16% indicated shared financial responsibility between spouses. Table (1) shows the basic characteristics of the participants.

 ISSN: Online 3005-7450, ISSN:Link 3005-7442

https://www.journals.uob.edu.ly/BUMEJ DOI: https://doi.org/10.37376/benuivmedj.v1i2

Table .(1) : Demographic characteristics of 74 participants included in the study

Characteristic (Total= 74)	No. (%)
Clinic	
Alom Alhanon	37(50)
Al Nukhba	19(25.6)
Other clinics	18(24.4)
Family income	
Less than 1000 Libyan dinars	40(54)
1000-1500 Libyan Dinar	27(36.5)
More than 1500 Libyan dinars	7(9.5)
Education level	
Primary school	10(13.5)
Secondary school	21(28.4)
University degree or higher	43(58.1)
Occupation	
Housewife	52 (70)
Employee	22(30)
Age	
<30 Year	47 (63.5)
≥30 Year	27 (36.5)
Pre pregnancy BMI	
Under weight	3 (4.1)
Normal	39 (52.7)
Over weight	20 (27)
Obese	12 (16.2)
First pregnancy	
Yes	28(37.8)
No	46(62.2)
Supplement intake*	
FA before pregnancy	19 (26)
FA after pregnancy	62 (83.7)
Multivitamins after pregnancy	15 (20.3)
*Some of the participants took the FA and/or supplements before and after pregnancy.	

 ISSN: Online 3005-7450, ISSN:Link 3005-7442
https://www.journals.uob.edu.ly/BUMEJ DOI: https://doi.org/10.37376/benuivmedj.v1i2

Anthropometric Measurements and Folic Acid (FA) Intake

The mean Body Mass Index (BMI) among participants was 24.9 (SD 4.5), indicating a normal weight status; however, 4% were classified as underweight, and 43% were categorized as overweight or obese (Table 1). Regarding FA intake, 26% of participants began consuming FA before pregnancy, while 58% initiated intake only after becoming pregnant, and 16% did not take FA at all. Additionally, only 20% reported taking multivitamins during their current pregnancy. A Chi-square test indicated no significant association between FA consumption prior to pregnancy and variables such as duration of marriage ($p = 0.64$), first-time pregnancy ($p = 0.79$), family monthly income ($p = 0.88$), or educational attainment ($p > 0.20$).

Daily average intake of food groups

As shown in Table 2, the daily average intake of various food groups revealed key insights. The median (IQR) daily intake was as follows: vegetables 228 g (133 g), milk and dairy products 395 g (298 g), fruits 220 g (309 g), fish and fish products 19 g (48 g), meat and meat products 141 g (93 g), and eggs and egg dishes 41 g (28 g).

Daily average intake of energy, macro and micronutrients and comparison with recommendations

As table (2) shows, the median daily energy intake was 10 MJ (5 MJ), with fat at 93 g (56 g), protein at 109 g (54 g), carbohydrates at 284 g (139 g), and fiber at 14 g (29.3 g). Analysis indicated that the distribution of energy from macronutrients fell within acceptable recommendations, with carbohydrates comprising 47.8%, protein 18.3%, and

 ISSN: Online 3005-7450, ISSN:Link 3005-7442
https://www.journals.uob.edu.ly/BUMEJ DOI: https://doi.org/10.37376/benuivmedj.v1i2

fat 36.3% of total energy intake. However, there was considerable variability in macronutrient intake, with carbohydrates ranging from 28.5% to 64.4%, protein from 10.3% to 30.7%, and fat from 26.3% to 45.2%.

The recommended dietary intake for fiber is 14 g per 1000 kcal (Institute of Medicine 2006). A new variable was created to calculate the fiber recommendations for each participant according to their reported energy intake using the formula:

The recommended dietary intake for fiber is 14 g per 1000 kcal (Institute of Medicine, 2006). An independent sample t-test comparing current fiber intake (mean 15.05 g, SD 6.39) with the recommended intake (mean 35.4 g, SD 12.77) revealed a significant deficiency ($p < .001$), with a difference of 20.36 g (95% CI: -23.65, -17.07).

 ISSN: Online 3005-7450, ISSN:Link 3005-7442

https://www.journals.uob.edu.ly/BUMEJ DOI: https://doi.org/10.37376/benuivmedj.v1i2

Table .(2): Mean and median food groups, macronutrients and energy intake (g/day) and the percentage of energy distribution from macronutrients among the 74 participants.

Food Group/Nutrient	Mean ± SD	Median (IQR)
Eggs and Egg Dishes (g/day)	44.4 ± 39.39	41 (29)
Meat and Meat Products (g/day)	158.8 ± 103.45	140.9 (92.91)
Fish and Fish Products (g/day)	40.7 ± 72.30	19.29 (47.54)
Milk and Milk Products (g/day)	461.3± 245.93	395.03 (222.69)
Fruit (g/day)	271.7 ± 214.96	220.40 (187.33)
Vegetables (g/day)	239.5 ± 129.5	228.32 (132.66)
Englyst Fiber Non-Starch Polysaccharides (NSP)	15.05 ± 6.39	14.14 (8.8)
Total energy intake (MJ)	10.6 (3.8)	10 (5)
Carbohydrate (g/day)	299.98 ± 111.09	284.33 (138)
Percentage of energy from Carbohydrate	47.8	
Protein (g/day)	116.10 ± 46.50	108.95 (53.7)
Percentage of energy from Protein	18.5	
Total Fat (g/day)	104.41 ± 44.37	92.96 (55.8)
Percentage of energy from Fat	36.7	

Table (3) illustrates micronutrient intake and comparisons with the Recommended Dietary Intake (RDI) for pregnant women aged 19 to 50 years. In summary, while the mean daily intake of Vitamin A, Vitamin C, Calcium, and Selenium exceeded the RDI, intakes of Iron and Folate were significantly below recommendations ($p < 0.001$), as detailed in Table (3). Intakes of Vitamin B12, Zinc, and Vitamin D met the RDI.

 ISSN: Online 3005-7450, ISSN:Link 3005-7442
https://www.journals.uob.edu.ly/BUMEJ DOI: https://doi.org/10.37376/benuivmedj.v1i2

Table .(3): A comparison between average daily intake of key vitamins and minerals and the dietary reference intake (DRI) for pregnant women aged 19-50 using one sample t test

	Mean ± SD	DRI	p value	95% Confidence Interval of the Difference	
Vitamin A retinol (µg/ day)	1708± 1784	770	<0.001	525.0	1351.6
Vitamin C (mg/day)	123 ± 57.7	85	<0.001	25.1	51.8
Iron (mg/day)	12.6 ± 5.4	27	<0.001	-15.6	-13.1
Calcium (mg/day)	1294 ± 447	1000	<0.001	190.8	397.9
B12 (µg/day)	11.4 ±10.2	2.6	0.25	-0.3	0.1
Zinc (mg/day)	12.8 ± 5.5	12	0.20	-0.5	2.1
Selenium (µg/day)	90.2± 46	60	<0.001	19.6	40.9
Folate (µg/day)	280 ± 104	600	<0.001	-505.9	-485.3
Vitamin D (µg/day)	5.5 ± 6.1	5	0.50	-1.0	1.9

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Discussion:

This study aimed to evaluate the dietary intake and FA use among pregnant women in Benghazi, Libya, following eight years of political instability and armed conflict. The findings revealed an imbalanced dietary intake among participants, despite seemingly adequate total energy intake and macronutrient distribution.

Although the participants consumed sufficient energy and macronutrients, significant deficiencies were observed in key nutrients such as fiber, iron, and folate. Notably, fruit and vegetable consumption exceeded the recommended five servings daily, but this did not compensate for the lack of essential micronutrients. The diet also exhibited elevated levels of vitamin A, which, while essential for fetal development, can have teratogenic effects if consumed excessively from animal sources like liver (23) . The mean daily intake of Vitamin A among the pregnant women in this study was significantly higher than the DRI of 770 µg/day ($p<0.001$). The 95% confidence interval for the difference between the mean intake and the DRI (525.0 to 1351.6) further supports this observation, indicating that the average intake substantially exceeds the recommendation. A balanced approach emphasizing plant-based sources of vitamin A and avoiding excessive intake from animal-based sources or supplements is crucial.

The study's findings were compared with other studies one from Libya (Misurata city) in Libyan females that was published in 2018 (24), and one from the United States in pregnant females that was published in 2023 (25). For instance, there was similarity in intake of energy (10.6 vs 11 MJ/day) and vitamin D (5.5 vs 5.1 µg/

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https://www.journals.uob.edu.ly/BUMEJ DOI: https://doi.org/10.37376/benuivmedj.v1i2

day), to those reported by Faid et al. in 2018 in Misurata city in Libya, but differences were noted in carbohydrate, protein, and fat consumption. Where our participants had higher carbohydrate (300 vs 232 g/day) and protein (116 vs 96.6 g/day) intake and lower fat intake (104 vs 129 g/day) compared to Faid et al. study. These discrepancies can be attributed to differences in study populations such as age and BMI. The participants in this study were younger (28 ± 5.3 years) and had a lower BMI (24.9 ± 4.5) compared to Faid et al. study (33.0 ± 9.3 years and 33 ± 9.3 BMI) and regional dietary variations and preferences, since Misurata city is located >800 km to the west of Benghazi (24).

When compared to a US study by Olendzki et al. that was conducted in 2023 (25), our participants consumed more energy (10.6 ± 3.8 vs 8.7 ± 2.2 MJ), but the percentage of energy from macronutrients was comparable. However, significant disparities in micronutrient content were observed, with lower consumption of iron (12.6 ± 5.4 vs 16 ± 5.6 mg), selenium (90.2 ± 46 vs 117.4 ± 40.8 µg), and folate (280 ± 104 vs 460.4 ± 143 µg) in current study. Calcium and zinc intakes were similar between the two studies (25). However, factors related to dietary assessment and analysis tools could limited these comparisons.

Only 26% of the participants-initiated FA supplementation before pregnancy as recommended (9). This rate was higher than that reported by Abdulmalek (2017) in Benghazi, where only 6% of women started FA supplementation before pregnancy. Post-pregnancy supplementation rates were also higher in this study (83.8% vs 74%). These differences may be due to demographic varia-

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https://www.journals.uob.edu.ly/BUMEJ DOI: https://doi.org/10.37376/benuivmedj.v1i2

tions, as the current study focused on pregnant women attending private clinics with higher educational attainment (26).

The low iron intake was consistent with the high prevalence of anemia among childbearing women in Libya, estimated at 29.9% in 2019 by the WHO (27) Iron deficiency anemia can lead to significant maternal and fetal complications, highlighting the need for targeted interventions to address this issue.

The study highlights a significant disparity between the high educational attainment and low employment rates among the participants. Despite 58% holding a university degree or higher, only 30% of these educated women were employed. This reflects a common challenge in Arab societies, where cultural and societal norms often prioritize family and domestic roles for women, limiting their workforce participation. This limited economic independence has profound implications for household income and the ability to access nutritious food and quality healthcare. The majority of households in the study had a monthly family income of ≤1500 Libyan Dinar (approximately $330), a relatively low figure. This economic structure restricts women's financial autonomy, even with high educational levels, hindering their ability to make independent decisions regarding their diet, healthcare, and overall well-being.

A significant proportion of participants (43%) were categorized as overweight or obese before pregnancy, which is lower than the national prevalence 66.8% in 2016 (27), but still raises concerns about potential adverse pregnancy outcomes. Pre-pregnancy obesity is associated with adverse health

 ISSN: Online 3005-7450, ISSN:Link 3005-7442
https://www.journals.uob.edu.ly/BUMEJ DOI: https://doi.org/10.37376/benuivmedj.v1i2

effects for the mother and the baby.

The conflict may not have led to acute malnutrition directly in this group but it could have contributed to a state of "masked malnutrition" characterized by imbalanced diets. However, establishing a definitive connection between these dietary deficiencies and the conflict is challenging due to several limitations such as the lack of data about diet and FA intake before the conflict. However, one can anticipate several factors associate the conflict with the observed situation. The first is the economic instability and reduced household incomes could have limited access to diverse and nutritious food options, forcing families to choose cheaper, often less nutritious alternatives. The second is the disruption of health care and shifting the priorities towards emergency services during the conflict, compromising the provision of essential maternal health services, including nutritional counseling and prenatal care.

This study represents a significant contribution to the limited literature on maternal nutrition in challenging environments. It provides valuable insights into the dietary habits of pregnant Libyan women within a specific sociocultural and economic context. However, limitations include the retrospective nature of the dietary assessment tool, which may be subject to recall bias, and the use of a convenience sample from private healthcare centers, potentially limiting the generalizability of the findings. A limitation of this study is the reliance on self-reported pre-pregnancy weight and height, which may be subject to recall bias. However, this method was chosen to establish a baseline BMI that was less likely to be

 ISSN: Online 3005-7450, ISSN:Link 3005-7442

https://www.journals.uob.edu.ly/BUMEJ DOI: https://doi.org/10.37376/benuivmedj.v1i2

masked by the initial weight fluctuations that can occur during the first trimester of pregnancy. The small sample size further restricts the ability to draw definitive conclusions. Future research should incorporate biomarker validation, utilize larger and more diverse samples, and conduct qualitative studies to explore the sociocultural factors influencing dietary choices and access to healthcare. While the EPIC-FFQ has been validated in other contexts, further investigation may be necessary to confirm its applicability in the Libyan context.

Public Health Implications:

The observed imbalances in nutrient intake among pregnant women in Benghazi may have significant implications for maternal and fetal health. Addressing these nutritional gaps requires a multi-pronged public health approach. This should include nutrition education emphasizing balanced diets and the importance of essential nutrients like iron and folic acid, food fortification to enhance the micronutrient content of staple foods, supplementation programs for women of childbearing age, and strengthening maternal health services to ensure access to quality prenatal care, including regular check-ups and nutritional counseling. By implementing these strategies, we can effectively improve the nutritional status of pregnant women in Benghazi and contribute to better maternal and fetal health outcomes.

In conclusion, this study elucidating the dietary intake and folic acid supplementation practices during the first trimester of pregnancy in Benghazi revealed significant dietary inadequacies, specifically low intakes of fiber, iron, and folate despite seemingly adequate energy and macronu-

 ISSN: Online 3005-7450, ISSN:Link 3005-7442

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trient consumption. Additionally, the uptake of pre-conception folic acid supplementation was low. These findings highlight substantial nutritional challenges faced by pregnant women in this conflict-affected region, underscoring the need for targeted interventions to improve their dietary quality and folic acid use to promote healthier pregnancies.

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 ISSN: Online 3005-7450, ISSN:Link 3005-7442
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Protective Effects of Olive Oil on Liver Tissue in Swiss Rats Treated with Cyclophosphamide: A Histopathological Study.

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Original Research Article

Abstract

Background: Cyclophosphamide (CP) is a commonly used chemotherapy agent acknowledged to have hepatotoxic effects. Olive oil, which is high in antioxidants, may offer protective benefits against damage caused by such drugs.

Aims: This study aims to search the potential protective effects of olive oil on liver toxicity induced by cyclophosphamide in a rat model.

Materials and Methods: A total of nine male albino rats were allocated into three distinct groups: A Control group, a CP group receiving 150 mg/kg, and a CP group receiving both 150 mg/kg of CP and 200 mg/kg of olive oil. The doses were administered on days one, three and five. On day seven, liver tissues were harvested for histopathological evaluation.

Results: Histopathological analysis showed that CP treatment resulted in extensive liver damage, especially affecting the portal tracts and central veins. The addition of olive oil appeared to reduce some of the toxic effects detected with CP, mainly in the portal tract and sinusoidal regions. Nonetheless, some degree of liver injury persisted in the group receiving both CP and olive oil. These results imply that olive oil may offer a protective benefit against CP induced liver toxicity in rats.

Conclusion: The administration of CP led to significant histopathological alterations in the liver tissues of rats. The concurrent use of olive oil seemed to alleviate some of these detrimental effects, likely attributable to its antioxidant properties. These findings suggest that incorporating olive oil could be beneficial as a protective measure during CP chemotherapy.

Keywords: Olive oil, Cyclophosphamide, Histopathological changes, Protective effect.

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Introduction:

Cyclophosphamide (CP) is part of the oxazaphosphorine family which are alkylating agents. It is a common chemotherapeutic medication used to treat various neoplastic diseases and was approved for use in the US in 1959 (1). It is commonly used to treat a variety of malignancies, including breast, lung, ovarian, endometrial, neuroblastoma, leukemia, and neuroblastoma in a combination with other chemotherapy drugs. CP is also usually used as an immunosuppressant to treat chronic autoimmune diseases such as multiple sclerosis, systemic vasculitides, rheumatoid arthritis, autoimmune skin diseases, and systemic lupus erythematosus (2). The administration of CP is typically intravenous, depending on the condition being treated. CP is a prodrug whose therapeutic effects depend on the liver's metabolic activities for activation and inactivation (3,4). CP introduces an alkyl-group into DNA when it is activated, it works by attaching an alkyl-group to the guanine base of the DNA at the imidazole ring's seventh nitrogen atom. This leads to permanent cross--linkages in the DNA strands at the phases G2 and S of the cell cycle, which ultimately ends cell death (5). However, side-chain oxidation which results in neurotoxic metabolites inactivates CP (3,4).

In severe conditions of aplastic anemia and other immune conditions, high doses of CP have shown successful results (6). Conversely, CP can induce a range of side effects due to its cytotoxic effects on rapidly proliferating cells. Adverse effects of CP include nausea, alopecia, sickness, thrombocytopenia, pulmonary fibrosis, facial abrasions, leukopenia, hematuria, increased skin

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pigmentation, diarrhea, hemorrhagic cystitis and others (3). With CP, numerous adverse medication responses are possible. Additionally, a tiny percentage of people have severe reactions that can be fatal or cause congenital defects, birth defects, or diseases that require prolonged hospitalization (7). To prevent drug-induced liver injury, it is essential to understand the pathological processes of liver damage, patient-related risk factors and drug-related risk factors.

Hepatotoxicity is one of the major side effects that can be caused by the application of CP. Several kinds of cytotoxic metabolites could be formed as a result of the metabolic conversion of CP (8). Phosphoramide mustard and acrolein are the two primary active metabolites that result in oxidative stress and harm cellular macromolecules such proteins, lipids and nucleic acid (9). When glutathione S-transferase is present, Acrolein is a highly reactive metabolite of CP with a short biological half-life, can easily interact with glutathione. Glutathione, a protein with thiol, plays numerous vital roles, including detoxifying electrophiles and reducing oxidative stress (10). Conversely, when glutathione levels are reduced, the reactive α, β unsaturated aldehyde acrolein increases the ability to interact with cellular nucleophiles, as the thiol-groups in cysteine within proteins, and the nitrogen atoms found in histidine and lysine. This interaction can lead to a loss of protein functionality and may induce oxidative stress, potentially resulting in significant damage to hepatocytes (11). Currently, various therapeutic strategies have been developed to mitigate the side effects associated with cyclophosphamide. These include combining multiple che-

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motherapeutic agents at reduced doses and utilizing alternative analogues of cyclophosphamide (12). However, the clinical outcomes have not been encouraging, as a significant portion of patients receiving these treatments still experience liver dysfunction (13, 14). Components of olive oil have been shown to possess anticancer properties by reducing DNA oxidation, halting the cell cycle, and inducing apoptosis in tumor cells (15,16). Incorporating olive oil into the diet has been proposed as a factor in protecting DNA and lowering cancer incidence.

The aim of study:

To examine the protective effects of olive oil against cyclophosphamide-induced histopathological changes in liver tissue of Swiss albino rats.

Materials and Methods:

Nine male albino rats were divided into three groups (n=9): a control group receiving saline, a cyclophosphamide group receiving 150 mg/kg cyclophosphamide only (ip), and a cyclophosphamide +Olive Oil group receiving 150 mg/kg cyclophosphamide (ip) followed by oral gavage 200 mg/kg olive oil. The doses were on day 1, 3 and 5. On day 7, rats were humanly sacrificed, and liver tissues were collected, fixed in formalin, processed using customary histological techniques, and stained with Hematoxylin and Eosin (H&E). Histopathological changes were assessed by a blinded pathologist using light microscope. Student t-test was done on the histopathological parameters by Excel Microsoft office professional plus 2016.

Results:

The liver sections from the control group:

Demonstrated a normal lobular architecture typical

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of healthy liver tissue. The lobule, the functional unit of the liver, displays a well-organized structure that is critical for proper liver function. Within the lobules, the hepatocytes are arranged radiating from the central-vein, developing anastomosing plates of hepatocytes. The hepatocytes displayed several notable characteristics: They appeared polyhedral, which is a typical morphology for liver cells. The cytoplasm was acidophilic, indicating a high presence of proteins and organelles. Each hepatocyte contained a round central nucleus, consistent with normal nuclear morphology. The portal tracts, or triads, observed in the sections contained several normal structures which is crucial for normal liver function (Figure 1).

The liver sections from the group treated with cyclophosphamide only:

Histopathological analysis of liver tissue of the rats treated with the CP only were characterized by the alteration of the normal liver structure with hepatic necrosis of the cells and degeneration adjacent to the central-veins of the liver. Furthermore, presented were eosinophilic cytoplasm of the hepatocytes with pyknotic nucleus. Inflammatory cell infiltration was also present (Figure 2 A). Figure (2) B showed, a region of congested hepatic cords, occupied with erythrocytes called red venous congestion and a region of congested hepatic cords, a large dilated central vein also packed with erythrocytes. However, presented was the portal-triad and surrounding tissue with dilated congested portal tract packed with RBCs and inflammatory cells, and a thicker than normal wall

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of portal vein with inflammatory cells and surrounded by fibrotic area and periportal early fibrotic changes and mild inflammatory cellular cuffing. Furthermore, the liver tissue showed with dilated sinosoids with cytolysis and pyknotic nuclei of hepatocytes adjacent to a congested portal tract show focal necrosis and dilated sinusoids, with megakaryocytic effect of hepatocytes was observed (Figure 3).

The liver sections of the group treated with Cyclophosphamide and Olive Oil:

Histological changes in the tissue sections showed an area of mild deteriorated liver cells (hepatocytes), and a slightly congested central-vein, mild lymphocytic infiltration. The loss of hepatic architecture is demonstrated at the portal tract and a mild portal vessels congestion with less fibrotic and inflammatory changes. Also found are the normal structure of the bile duct, with normal hepatic nucleus structure (figure 4). Also shown in (figure 5). solitary in the center focal necrosis, with cytolysis and pyknotic nuclei of hepatocytes, eosinophilic hepatocytic granules are noticed, with monotonous nuclei with fine chromatin distribution.

Table .(1). shows the histopathological parameters of livers of rats administrated by cyclophosphamide vs cyclophosphamide with olive oil. The control group showed no significant histopathological modifications. The group treated with cyclophosphamide only higher pathological change but in the group treated with the cyclophosphamide and olive oil there is a less effect on the portal tract area and the sinusoids region. Student t-test showed a significant difference between the parameters of the control group vs the cyclo-

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phosphamide group and between the control group vs the cyclophosphamide with olive oil group. But no difference was shown between the cyclophosphamide vs cyclophosphamide with olive oil group, $p<0.05$.

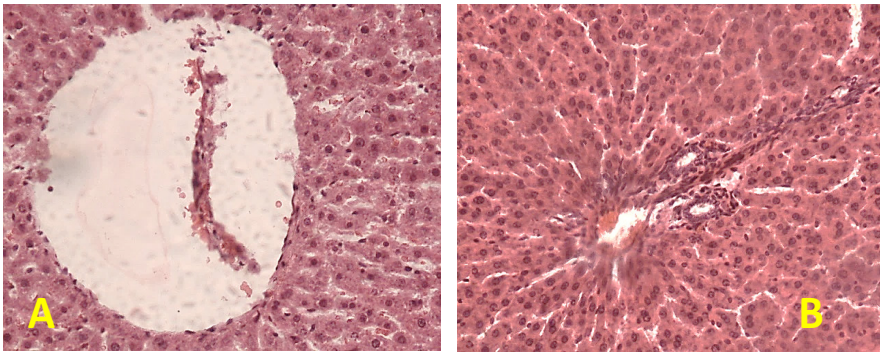

Figure .(1): Micrograph of control hepatic tissue. H and E stain. (A): Shows hepatocytes with normal central vein structures. (X200). (B): Shows normal portal-spaces, and normal structured hepatocytes. (X400).

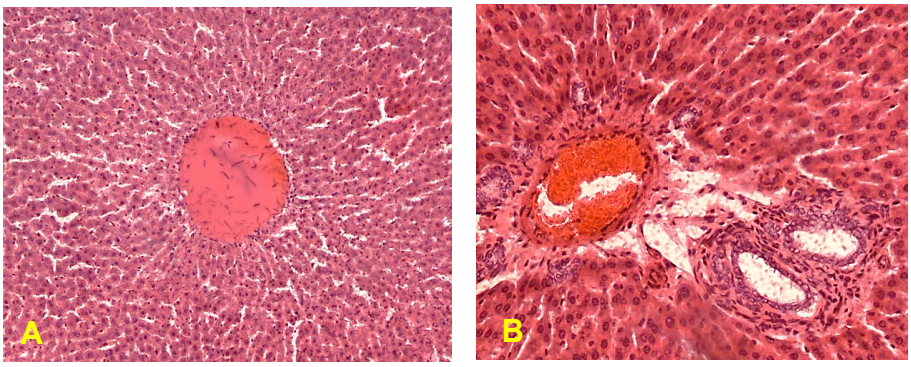

Figure. (2): Micrograph of hepatic tissue treated with Cyclophosphamide. H and E stain. (A): Displays a congested central vein and adjacent tissue with an area packed with erythrocytes (X100) (B): Demonstrates the portal triad and neighboring tissue with dilated congested portal tract packed

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with RBCs, with a thickening wall of portal-vein and periportal early fibrotic alterations and mild inflammatory cellular cuffing. (X200).

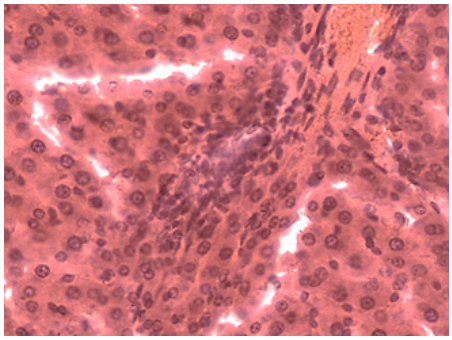

Figure .(3): Micrograph of hepatic tissue treated with Cyclophosphamide. H and E stain. (X400) Shows a congested portal tract at the upper right

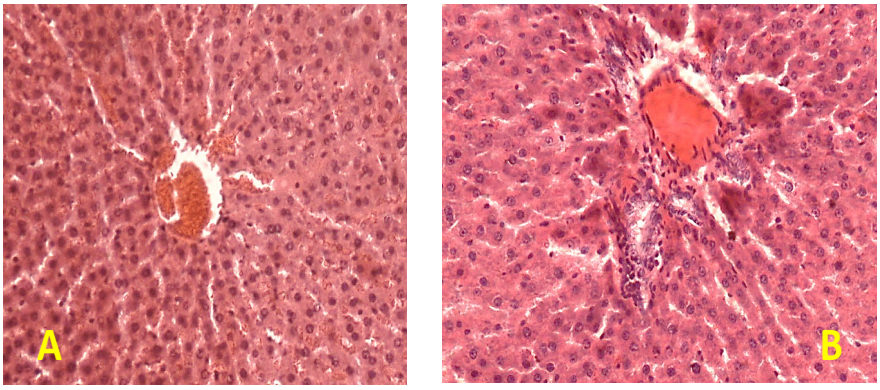

Figure .(4): Micrograph of hepatic tissue treated with both the Cyclophosphamide and Olive Oil. H and E stain. (A): Displayed, an area of slightly congested central vein. (X200) (B): Portal tract with a mild portal vessels congestion with normal bile duct structure and normal hepatic nucleus structure. (X200)

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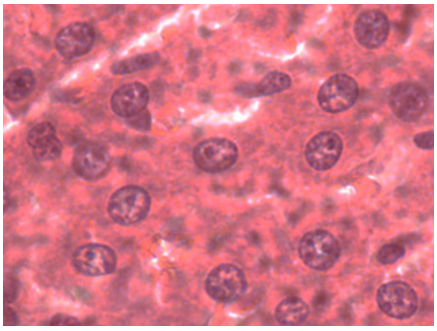

Figure.(5): Micrograph of hepatic tissue treated with both the Cyclophos-phamide and Olive Oil. H and E stain. Eosinophilic hepatocytic granules are noticed, with monotonous nuclei with fine chromatin distribution. (X1000)

Table .(1): Histopathological parameters of livers of rats administrated by cyclophosphamide vs cyclophosphamide with olive oil

Groups		Control	CPA	CPA & OO
Hepatocytes cellular changes	Hepatic vacuoles (steatosis)	-	-	-
	Cytolysis Pyknotic changes	-	+++	+++
Portal tract region	Congestion	++	++++++	++++
	Inflammatory changes	-	++	+
	Fibrotic changes	-	+ / ++	+ / +/-
Sinusoids and/or ducts	Inflammatory changes	-	-	-
	Dilatation	----	+++	---+++
	Necrosis	-	++/(FN)	+/(FN)

(+/++) Mild to moderate fibrotic changes

(+ / +/-) Mild to focal fibrotic changes

++/(FN) Mild to focal necrosis detected

++/(FN) Moderate to focal necrosis detected.

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Discussion:

This study was designed to assess the histopathological effects of CP on the hepatic tissue of albino rats and to estimate the potential protective effects of olive oil against the damage induced by CP. CP is known to effect different tissues especially when taken in large doses, the most histological studied tissues are the liver, kidney and testis. the studies showed large histopathological hepatic and nephrotoxic effects (17,18, 19). Also, when the olive oil was administered to the group with CP and olive oil it showed that the olive oil has a defensive effect against the toxic effects of the CP hepatotoxicity (20).

In this study the liver tissue from the control group displayed normal lobular architecture with well-organized hepatocytes, central veins, and portal tracts. In contrast, the liver sections from the CP-treated group showed significant alterations, including hepatocyte necrosis, congestion of hepatic cords, and inflammatory cell infiltration. CP treatment has been associated with disturbances in hepatic blood flow and cellular integrity, leading to the observed necrosis and degeneration of hepatocytes. According to a study by Talebpour et al. (2018), cyclophosphamide can induce oxidative stress and inflammation, contributing to hepatocyte injury and death (21). The presence of pyknotic nuclei within the hepatocytes further indicates cell death, a hallmark of necrosis (22). The infiltration of inflammatory cells within the liver tissue is indicative of an immune response to the damage inflicted by CP. The accumulation of inflammatory cells can aggravate liver injury through the release of proinflammatory cytokines and reactive oxygen

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https://www.journals.uob.edu.ly/BUMEJ DOI: https://doi.org/10.37376/benuivmedj.v1i2

species, which further exacerbate hepatocyte damage (3). This aligns with findings from various studies that highlight the role of inflammation in drug-induced liver injury (17).

The histopathological analysis revealed areas of red venous congestion characterized by dilated hepatic cords filled with erythrocytes. This occurrence is frequently observed in situations where hepatic blood flow is compromised, leading to increased pressure within the central veins (23). The observed red venous congestion and thickening of the portal vein walls are consistent with reports of CP-induced hepatic injury, further underlining the drug's potential to cause systemic toxicity (24). Additionally, the dilated portal tracts occupied with erthrocytes and inflammatory cells suggest portal hypertension or impaired venous drainage, which can occur as a consequence of hepatocyte damage and inflammation (25). Furthermore, the presence of periportal inflammatory cellular cuffing suggests constant inflammation that can lead to fibrosis if the noxious stimulus persists (26). The progression from inflammation to fibrosis is a well-documented pathway in liver pathology, emphasizing the significance of early intervention to prevent irreversible damage. Moreover, the dilated sinusoids with cytolysis and pyknotic nuclei adjacent to congested portal tracts reflects severe hepatic injury. This finding is consistent with studies indicating that sinusoidal dilation often accompanies liver injury and can lead to impaired hepatic function (27, 28). The megakaryocytic effect noted in some hepatocytes may suggest an adaptive response to stress or injury, potentially indicating altered hematopoiesis or

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thrombopoiesis in the context of liver dysfunction (29). The solitary focal necrosis observed, along with cytolysis and pyknotic nuclei in hepatocytes, indicates localized areas of cell death. Focal necrosis can be a common feature in drug-induced liver injury and is often associated with areas of significant oxidative stress or metabolic disturbance (30). The presence of eosinophilic hepatocytic granules suggests alterations in protein synthesis or storage within hepatocytes, potentially linked to the liver's response to injury (30).

In the group treated with both CP and olive oil, the histopathological changes in the liver were less prominent, the tissues displayed only mild degeneration of hepatocytes, slight congestion of the central vein, and limited lymphocytic infiltration. Moreover, the preservation of bile duct structure and normal hepatic nuclei suggests that olive oil provided some level of hepatoprotection.

This protective effect could be accredited to the anti-inflammatory and antioxidant properties of olive oil, which may help to neutralize ROS and reduce inflammation, thereby protecting hepatic cells from severe damage (31) this protective effect is also shown in other tissues (20). The existence of mildly degenerated hepatocytes suggests that while CP exerts hepatotoxic effects, the degree of damage is relatively moderate compared to the group treated with the CP only. Degeneration may manifest as cellular swelling, fatty change, or necrosis, which can be attributed to oxidative stress induced by CP (21). The protective effects of olive oil, rich in antioxidants such as oleic acid and polyphenols, may alleviate some of this damage, as suggested

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by studies indicating that dietary antioxidants can reduce oxidative stress in liver tissues (32,33,34). The beginning of slight congestion in the central vein and mild portal vessel congestion may indicate early vascular changes due to impaired hepatic blood flow. This can be a consequence of inflammation or cellular injury leading to increased pressure within the hepatic vasculature (23). The relatively mild nature of these changes suggests that the combination of CP with olive oil may have a protective effect that limits the extent of vascular compromise. Mild lymphocytic infiltration is indicative of an immune response to hepatocyte injury. While CP is known to induce inflammation and immune-mediated damage, the presence of olive oil may help modulate this response. Studies have shown that certain dietary fats can influence inflammatory pathways and reduce the severity of inflammation in liver injury (3). The reduced fibrotic modifications detected in this group could also point to a lower chronic inflammatory response, which is crucial for preventing long-term liver damage. These findings underscore the importance of dietary components in modulating drug-induced liver injury and suggest potential avenues for further research into protective strategies against hepatotoxicity.

Conclusion:

The results of this study indicate that CP causes considerable histopathological damage to the hepatic tissue of albino rats by demonstrating significant hepatocellular injury, inflammation, and alterations in vascular architecture. On the other hand, the histopathological changes observed in the liver sections from the CP and olive oil-treated group indicate a

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moderate degree of hepatotoxicity characterized by mild degeneration, vascular congestion, and localized necrosis. The protective effects of olive oil appear to mitigate some of these changes, preserving bile duct structure and reducing inflammation and fibrosis.

Recommendations:

These findings emphasize the need for careful monitoring of liver function in patients undergoing CP therapy and suggest potential pathways for therapeutic intervention to mitigate liver damage.

Ethical approval: All procedures were done with high ethical standards minimizing pain and distress and ensure humane treatment. All protocols are reviewed by the Faculty of Biomedical Sciences at the University of Benghazi scientific committee for compliance.

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Awareness of the Health Effects of Smoking Among Secondary School Students in Benghazi City.

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Original Research Article

Abstract

Background: Increasing public awareness of the health risks associated with tobacco smoking is one of the most effective strategies for reducing tobacco use.

Aim: To assess the level of awareness about the health risks of smoking among secondary school students in Benghazi City.

Methods: A cross-sectional study was conducted involving male secondary school students .in Benghazi.

Results: The study included 345 students their mean age was 16.9±0.83 years. Prevalence of smoking in students was 12.8%, while 5.2% were ex-smoker and 82% never smoke. Rate of smoking decrease by increasing the level of father's education. Mean age of starting smoking was 13.5±2.1years, 18.2% of current smoker start smoking at age ≤10years.Current smoker 77.3% of them their friends were smoker.More than half (56.8%) of current smoker their fathers were smoker .Opinion of student about smoking , 86.9% they were sure about the effect of smoking to health ,about the effect of their friends on acceptability of smoking only 7% were sure ,69.3% of student sure about harmful effects of passive smoking , only half (52.3%) of smoker had desire to quit smoking .The range of their knowledge about Harmful effects of smoking was 93% for Cardiovascular diseases and lung cancer to 50% for male infertility . Majority tried to stop smoking (81.8%). Source of information about smoking was 41.7% from family &friends.

Conclusion: This study demonstrates the significance of parents' educational attainment in relation to their children's smoking behavior. The presence of a family member who smokes at home has an impact on this influence. Additionally, it demonstrates that when teenagers are young and spend a lot of time with their friends, the actions of those who smoke have a big impact on the others. The majority of students knew that smoking cigarettes has health risks.

Key words: Smoking, Adolescent, knowledge, attitude, students practice .

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Introduction:

Smoking is a major public health concern, responsible for around six million deaths globally every year. (1) The leading causes of death include lung cancer, ischemic heart disease, stroke, and chronic obstructive pulmonary disease (COPD). (2) Most smokers start at a young age, with 83% of smokers in the United States beginning before the age of 18yrs. (3) Smoking in childhood and adolescence leads to both immediate and long-term health problems. Reduced lung development and function, shortness of breath, and decreased exercise capacity are common early symptoms, often misdiagnosed as asthma. Additionally, early smoking increases the risk of lung cancer, esophageal, bladder, and oropharyngeal cancers, as well as heart disease and stroke in adulthood. (4) There is also an increased risk of atherosclerosis and engagement in risky behaviors such as drug use and violence among young smokers. (4) Furthermore, exposure to secondhand smoke can cause serious health issues in people who do not smoke.(5) Tobacco use typically begins during adolescence, and the earlier an individual starts smoking, the more difficult it becomes to quit later in life.(3) This early initiation of smoking is a critical public health concern, as adolescent smoking often leads to lifelong addiction and significant health risks, including respiratory and cardiovascular diseases shows that children in middle-class American families start smoking at an average age of 8.5 years, with the onset of smoking behaviors ranging between 6 and 11 years old(3).In 2006, 6.8% of students between the ages of 11 and 14 in the U.S. reported smoking (6), and 12.6% of high school students re-

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ported using two or more smoking products (7).By 2011, smoking prevalence among boys aged 13 to 15yrs ranged from 7.9% to 15.9% in several countries, including the U.S., Germany, Turkey, Greece, and Serbia(2,3,6). Global comparison highlights the persistence of adolescent smoking across different cultural and socioeconomic settings. The U.S. Centers for Disease Control and Prevention (CDC) showed that in 2021, 4.0% of middle school students and 13.4% of high school students had used a tobacco product at least once in the past month (8). Despite widespread anti-smoking campaigns, tobacco use among young people remains a major concern in the U.S. If the current smoking rate among youth continues, 5.6 million Americans under 18 are projected to die prematurely from smoking-related illnesses (9). This equates to around 1 in every 13 Americans who are currently aged 17 or younger. (9)

Despite widespread information about the dangers of smoking, the prevalence of teenage smoking remains high. Teaching students about these risks, along with the dangers of secondhand smoke, is crucial in efforts to reduce tobacco use. (5) .

Aim: To assess the level of awareness about the health risks of smoking among secondary school students in Benghazi City.

Methods and materials:

A cross-sectional study was conducted among 345 male secondary school students in Benghazi between the 1st. of February to the 31st. of March 2023. Stratified random sampling ensured the participation of students from various schools in Benghazi (private). All participants were selected from different grade levels, only male students were included

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due to cultural stigmas against female smoking.

Data collection:

A pre-tested, an anonymous self-completion questionnaire was used to gather data. The students were asked questions regarding demographic data, smoking status, the age at which they start smoking. In addition, they were asked about the smoking status of their parents, family members and friends. Finally, they were asked about their awareness of harmful effects of smoking, Previous attempt to stop smoking and the source of information about smoking.

Type of the sample: Convenence sample, students available during time of collection of data were included in the study.

Sample size: Number of students in 6 selected private school were (1700 students)

Sample size by Krjcie & Morgan sample size table (10) was 313, 10% of the sample was added for any missing data (32 student)313+32= 345 students.

Statistical Analysis:

Data were analyzed using SPSS version 26. Descriptive statistics were used as mean, standard deviation, minimum and maximum value. Inferential statistic was used as x^2 test considered significant when $p \leq 0.05$. Data was represented in form of tables and figures.

Ethical consideration:

Anonymous self-completion questionnaires were used to ensure the confidentiality of collected information. Verbal consent was obtained from all students and head master of the schools.

Results:

-The students' ages ranged from 15 to 19 years, with 17 years being the most common (48.7%), while only 2% of the students were 19

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years old (Figure 1).

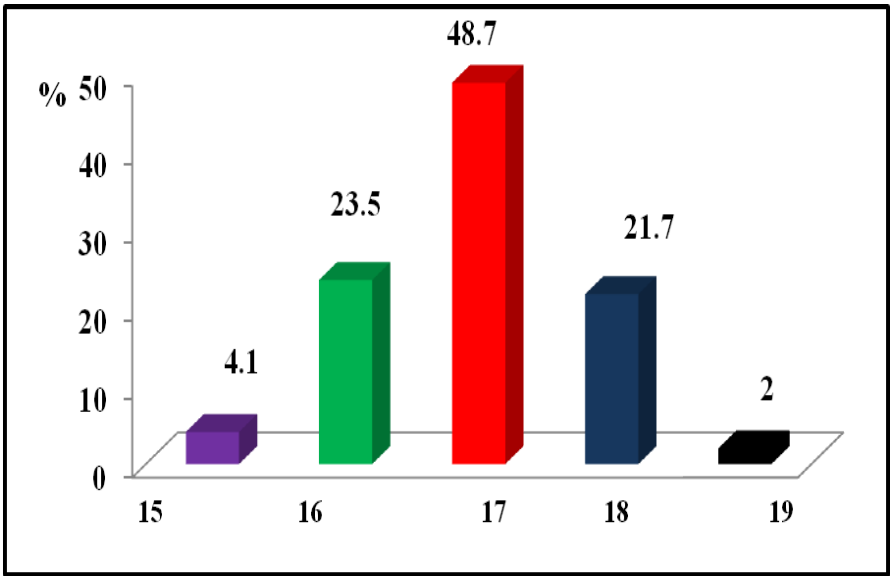

Figure. (1): Distribution of student according to age.

-Mean age =16.9years. Std. Deviation = 0.83, Median=17years, Minimum=15years, Maximum=-19years.

-The vast majority of the students had never smoked (82%), 5.2% were ex-smokers, and 12.8% were current smokers (Figure 2).

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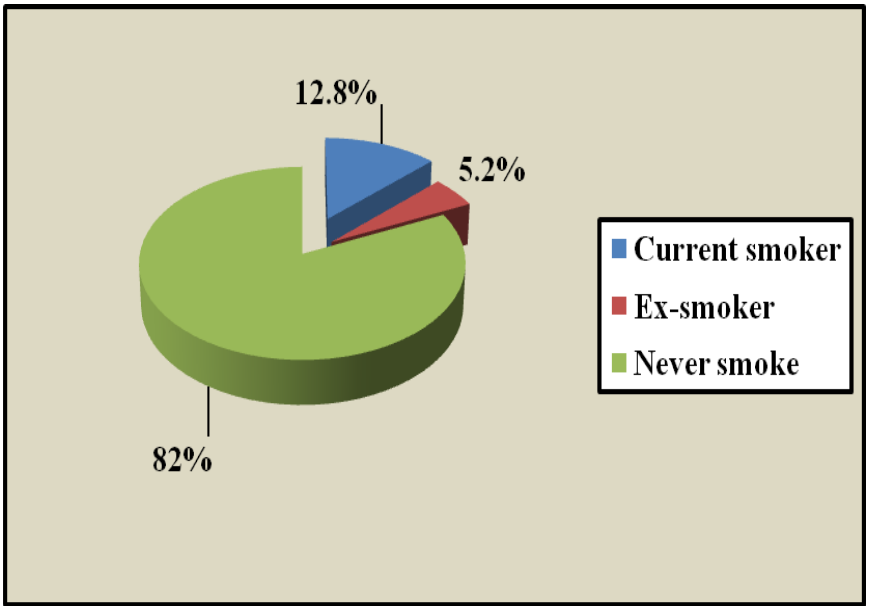

Figure. (2): Distribution patients according to smoking status of students.

-Among all the studied socio-demographic factors, a lower level of father's education, father's smoking, friends' smoking, and the presence of other smokers in the family were significantly ($P < 0.05$) associated with students' smoking habits, Table (1).

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VOLMUE:2 ISSUE:1 June: 2025 BUMJ

Table .(1): Social factors and smoking among secondary school students.

Factors	Smoker (%)	Ex-smoker (%)	Non-smoker (%)	P -value
Age /year 15 16 17 18 19	0 (0) 7 (8.6) 21 (12.5) 13 (17.3) 3 (42.9)	14(100) 71(87.7) 137(81.5) 8(77.3) 3(42.9)	0(0) 3(3.7) 10(6) 4(5.3) 1(14.2)	0.096
Father's education Primary Secondary University	9(47.4) 18(12.4) 17(9.4)	1(5.2) 7(4.8) 10(5.5)	9(47.4) 120(82.8) 154(85.1)	0.0001*
Mother's education Primary Secondary University	5(27.8) 14(12.8) 25(11.5)	2(11.1) 4(3.7) 12(5.5)	11(61.1) 91(83.5) 181(83)	0.184
Father's work Employee Self employed Not employed	23(10.8) 20(15.6) 0(0)	12(5.7) 6(4.7) 0(0)	177(83.5) 102(79.7) 4(100)	0.651
Mother's work Employee House wife	25(14.1) 19(11.3)	8(4.5) 10(6)	144(81.4) 139(82.7)	0.642
Age of starting smoking ≤10 11-15 >15	8(18.2) 28(63.6) 8(18.2)	1(5.6) 15(83.3) 2(11.1)	- - -	0.357
Friends who smoke Yes No	34(77.3) 10(22.7)	14(77.8) 4(22.2)	135(47.7) 148(52.3)	0.0001**
Fathers who smoke Yes No	25(56.8) 19(43.2)	11(61.1) 7(38.9)	103(36.4) 180(63.6)	0.006**
Other person at home who smoke Yes No	24(54.5) 20(45.5)	6(33.3) 12(66.7)	72(25.4) 211(74.5)	0.019*

* Significant. ** Highly significant.

-According to the majority of the students, both active and passive smoking were considered harmful to health (86.9% and 69.3%, respectively). Only 7% of the students agreed that friends influenced their acceptance of smoking.

-More than half of the students (52.3%) had a desire to quit smoking, table (2).

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Benghazi University Medical journal
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BUMJ VOLMUE:2 ISSUE:1 June: 2025

Table .(2): Opinion of students about smoking

Opinion of students about smoking	Yes sure		Perhaps yes		Perhaps no		Not sure		No answer	
	No	%	No	%	No	%	No	%	No	%
Smoking affects the health	300	86.9	23	6.7	6	1.7	12	3.5	4	1.2
Short term of smoking unsafe	24	7	38	11	28	8.1	206	59.7	49	14.2
Effect of their friends on acceptability of smoking	24	7	31	9	24	7	266	77	0	0
Harmful effects of passive smoking:	239	69.3	45	13	20	5.9	25	7.2	16	4.6
Stop smoking (desire to quit smoking)*	23	52.3	12	27.3	4	9	5	11.4	-	-

-The majority of the students were aware of most of the harmful effects of smoking. However, only half (50%) knew about its impact on male fertility (Table 3)

Table .(3): Knowledge of students about the harmful effects of smoking

Harmful effects of smoking	Yes		No		Do not know	
	No	%	No	%	No	%
Asthma	310	90	10	3	25	7
Cardiovascular diseases	321	93	9	3	15	4
Chronic cough	306	89	18	5	21	6
Lung cancer	322	93	8	3	15	4
Esophagus cancer	275	80	36	10	34	10
Urinary bladder cancer	221	64	75	22	49	14
Pharynx cancer	292	85	28	8	25	7
Gum cancer	293	85	27	8	25	7
Hypertension	253	73	45	13	47	14
CVA	269	78	36	10	40	12
Male infertility	174	50	110	32	61	18
Stomach ulcer	235	68	63	18	47	14
Dental carries	300	87	24	7	21	6
Stress	245	71	60	17	40	12
Social fight	261	76	48	14	36	10
PVD	251	73	46	13	48	14

-Figure 3 shows that a large percentage (81.8%) of the smokers had made at least one attempt to quit smoking.

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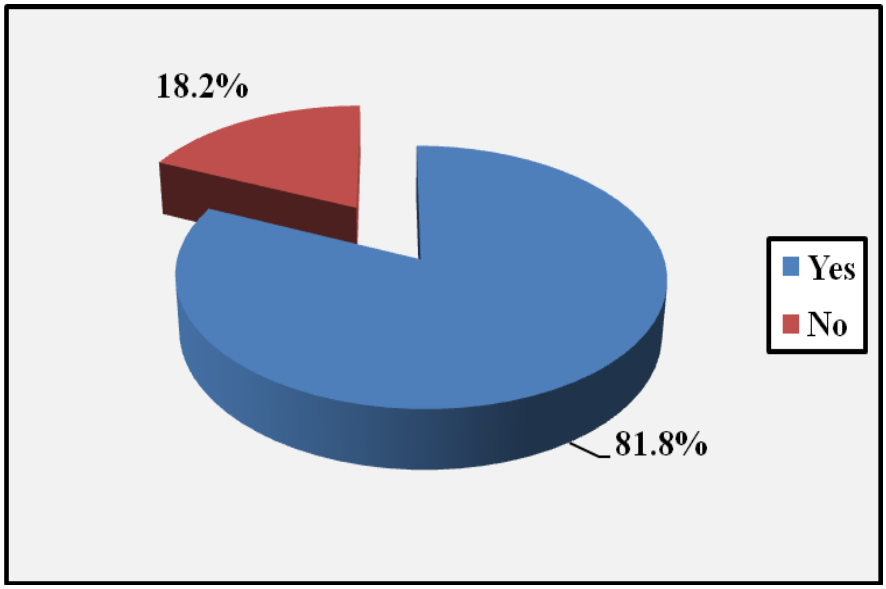

Figure.(3): Previous attempt to stop smoking.

The most common sources of information were friends and family (41.7%), followed by the internet (29.9%). Only 2.9% of the students gained their knowledge about smoking from awareness campaigns, and television was a source for just 1.2% of the students, figure (4).

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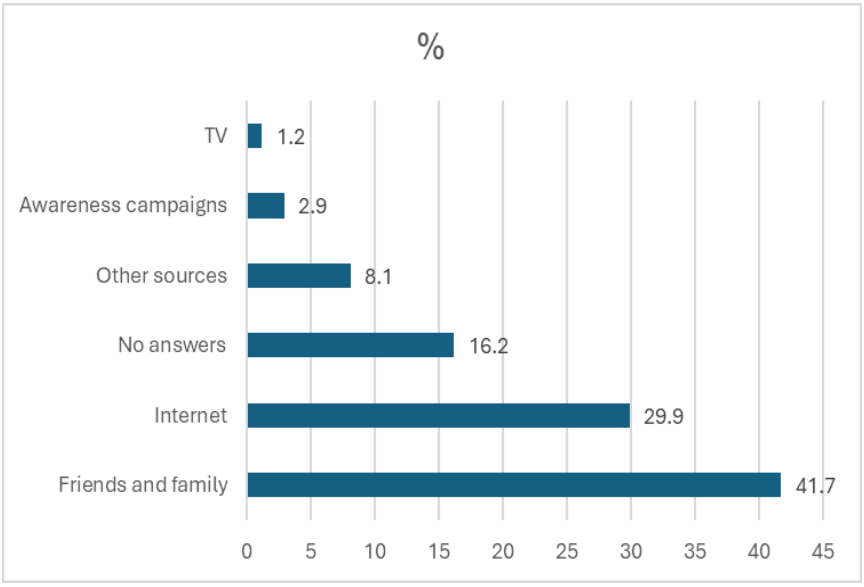

Figure. (4): Source of information about smoking.

Discussion:

The study included 345 student their Mean age was 16.9±0.83 years, with minimum age 15 years and maximum 19years, around half of them (48.7%) their age was 17 years. Prevalence of smoking in students was 12.8%, while 5.2% were ex-smoker and 82% never smoke. This result similar to other study were 13.4% of high school students in the U.S. admitted that they using tobacco products regularly (4), also similar to nearby counties such Egypt and Tunis (12% and 16%respectively), (11-12) while in Saudia (37%) were currently smoked, and of these, 83.7% had started smoking at the age of 14 years or less. (13)

There was no effect of student age in smoking status p =0.096 or fathers education p= 0.561.

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Rate of smoking decrease by increasing the level of education of their father's primary education fathers 47.4% of their children were smoker, secondary level 12.4% smoker and university level 9.4% of their children were smoker p 0.0001highly significant, the result similar to other study (13).The mothers education level had the same pattern of fathers level, 37.8% of primary level their children were smoker, 12.8% of secondary level and 11.5% of university level but this difference was not statistically significant p = 0.184, but in other study the association was significant.(13). The significant effect of the father's and mother's education on their children's behavior is to be expected especially in the Libyan society where children of that age are still presumably influenced by their home values and beliefs. Moreover, it is assumed that a better educated mother and/or father could deal, in most cases, more effectively and rationally with the behavior of their children. (14,15)

There was no relation of father's occupation and smoking status of student, p= 0.651, nor mothers' occupation affect the smoking status p =0.642, the result similar to Saudia study. (13). Mean age of starting smoking was 13.5±2.1years, with median 14 years, minimum age was 9 years and maximum were 17years, in other study the mean age was 17.06±0.8years (13).Age of starting smoking ,18.2% of current smoker start smoking at age ≤10years, 63.6% of them start at age 11- 15 years and 18.2% start smoking at age more than 15 years , 5.6% of ex-smoker start smoking at age ≤10years , 83.3% start at age 11-15 years and 11.1% start at age >15years , the difference between

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smoker and ex-smoker on age of starting smoking was not statistically significant p value =0.357. At this age, it is expected that peer pressure will play an important role on the students' behavior, current smoker 77.3% of them their friends were smoker, 77.8% of ex-smoker their friends were smoker , and 47,7% of never smoke their friends were smoker, this difference was highly statistically significant p value=0.0001 .More than half (56.8%) current smoker their fathers were smoker, 61.1% of ex-smoker their fathers were smoker and 63.6% of never smoke had their fathers were smoker, this difference was statistically significant p value = 0. 006.Current smoker 45.5% of them had family member smoker, 33.3% of ex-smoker had family member smoker, while never smoker had 25.4% of family member smoker. this difference was statistically significant p value=0.019, these results similar to other study finding (13).Opinion of student about smoking, 86.9% they were sure about the effect of smoking to health, but 59.7% of them not sure that the short term of smoking unsafe, about the effect of their friends on acceptability of smoking only 7% were sure ,69.3% of student sure about harmful effects of passive smoking , only half (52.3%) of smoker had desire to quit smoking In other study only 47.6% of students aware of bad effect of passive smoking (13).The range of their knowledge about Harmful effects of smoking was 93% for Cardiovascular diseases and lung cancer to 50% for male infertility .A positive finding was that most of the students tried to quitting smoking (81.8%), study in Saudia found that (75.1%) of student had tried to quit. (13) Source of infor-

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mation about smoking was 41.7% from family &friends,29.9%from internet, 2.9% from awareness campaign, from TV 1.2%, while 8.1% from other sources and 16.2%no answer

Conclusion:

This study demonstrates the significance of parents' educational attainment in relation to their children's smoking behavior. The presence of a family member who smokes at home has an impact on this influence. Additionally, it demonstrates that when teenagers are young and spend a lot of time with their friends, the actions of those who smoke have a big impact on the others. The majority of students knew that smoking cigarettes has health risks.

Recommendation:

-Well-planned antismoking programs for students are urgently required.

-School-based smoking cessation programs are necessary, with the involvement of families.

-Public education on the health effects of smoking should be disseminated through all forms of mass and social media.

-Further research is needed on smoking behavior.

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Assessing Clinicopathologic factors in uterine leiomyoma patients in East Libya.

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Original Research Article

Abstract

Introduction: Uterine leiomyomas (ULs) are benign tumors of smooth muscle tissue; occur in women of reproductive age, with clinical manifestations depending on their size, and location.

Aim: To assess the clinicopathologic factors related to uterine leiomyomas.

Materials and methods: The data were collected from the Electronic Archive Unit, Benghazi Medical Center using structured forms. Descriptive, retrospective study was accomplished, using data over the period of Jan 2020-Dec 2021. Statistical analysis was done using IBM SPSS, version 20.

Results: Seventy-three cases were included in the study with mean age of 43.31 ±7.31 years, (54.9%) of cases were in the age group 41-50 years, with statistically significant difference in the cases above forties. Blood group O+ represented in (32.9%) of total cases, followed by blood group A+. Uterine leiomyomas were higher among the married women (42.5%). Among the clinical features, menorrhagia was the common complaint in (50.7%) of cases. With statistically significant difference, Menorrhagia, Irregular bleeding, and Pain (pelvic / abdominal) were occurred more in the age group 41-50 years, while Dysmenorrhea and Infertility were in younger age between 31-40 years. Myomectomy was performed in (74%) of cases. Multiple uterine leiomyomas were in (54.8%) of cases. The mean tumor size was 6.75±4.25 cm. Associated changes are seen, the Endometrial hyperplasia was in one case, adenomyosis was found in 4 cases, chocolate cyst in 5 cases and simple cyst in one case.

Conclusion: Uterine leiomyomas occur in childbearing age and premenopausal women, more in whom with blood group O+. The multiple leiomyomas were commoner than single. Married patients were more affected than the single. Menorrhagia was a frequent presenting complaint.

Key words: Uterine leiomyomas, Multiple leiomyomas, Menorrhagia, Dysmenorrhea, Infertility.

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Introduction:

ULs are the most common benign tumors in women of reproductive age, originate from the uterine smooth muscle tissue, and their growth depends on estrogen and progesterone (1). The ULs vary in size, shape, and location (2). Increasing age and African descent are the major risk factors for fibroid (3,4). The incidence of the ULs is underestimated since many ULs have mild or no symptoms, so remain undiagnosed. The estimated prevalence ranges from 4.5% to 68.6% depending on population under study and method of diagnosis (4,5).

The clinical manifestations of ULs depend on their size, location and hormonal effects (4,6). Dysmenorrhea, menorrhagia, pelvic pain, infertility, abortion, preterm labour and complications among the pregnancy affect the patient performance, social and daily life activity. The symptoms are severe in about 25% of women, and the treatment is required (5). Since the UL is a morbid tumor, hysterectomy is indicated in the cases with significant morbidity (7). Myomectomy is done depending on the size and location of ULs and the symptoms-fertility goal, as reported that myomectomy can increase the pregnancy rate for patients with infertility (8).

This study is aimed to assess the clinicopathologic factors related to uterine leiomyomas. The objectives were to find the mean age, the frequency of ULs in different age groups, comparing the age groups above and below 40 years, the relation of ULs to blood groups, patient's marital status, and complaints, type of operation, number and size of ULs. Location of ULs and associated changes in the endometrium and ovaries.

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Materials and Methods:

Study design

A retrospective cross-sectional study of 73 cases with ULs. The study took place in Benghazi Medical Centre (BMC) in Benghazi, from January 2020 to December 2021. A consent was obtained from BMC management. The data were collected from the Electronic Archive Unit, Benghazi Medical Center using structured forms and represented in the patient's age, blood group, marital status, complaints, type of operation, number and size of ULs. Location of ULs and associated changes in the endometrium and ovaries are also collected (when available).

Data analysis

The collected data are statistically analysed using IBM SPSS Statistics for windows, version 20 (IBM Corp., Armonk, N.Y., USA). The continuous variables like patient`s age were presented as mean±standard deviation and also categorized into groups, while the tumor size was presented as mean±standard deviation.

Comparing means of the two age groups were done using t-test, the difference was considered statistically significant when (P-value <0.05)

Categorical variables were presented as number and percentage.

Chi-square test was carried out to assess significant differences among groups, Chi square regarded as significant when (P-value <0.05).

Results:

ULs are commonly seen in women of childbearing age. In the current work, the patient's age was available for 71 cases out of 73 cases with a mean of 43.31 ±7.31 years (age range: 30-74 years). The patient's age was categorized into different age groups; the majority of the patients were in the age group 41-50

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years as shown in figure (1).

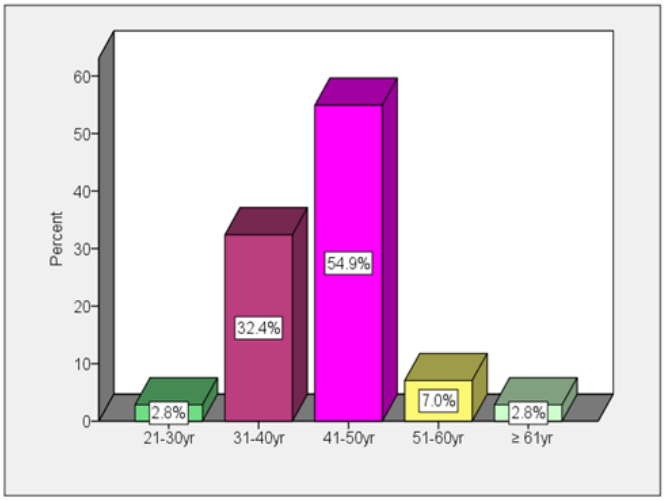

Figure .(1): Age distribution of patients with ULs.

A significant difference in the mean age of women below the forties and above the forties is shown in table (1), with that ULs are more in women above forties.

Table .(1): Comparing mean of the two age groups above and below 40yr using t-test.

Age groups	%N	Mean	Std. Deviation	P- value
Age<40yr	(26.8%)19	35.00	2.94	0.0001
Age≥40yr	(73.2%)52	46.34	5.92	

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Among different blood groups, in the current study, ULs were highest in blood group O (37%) of cases. Blood group O+ is the commonest, followed by blood group A+ and blood group B+, then other blood groups as shown in figure (2). Eleven cases, their blood groups were not available.

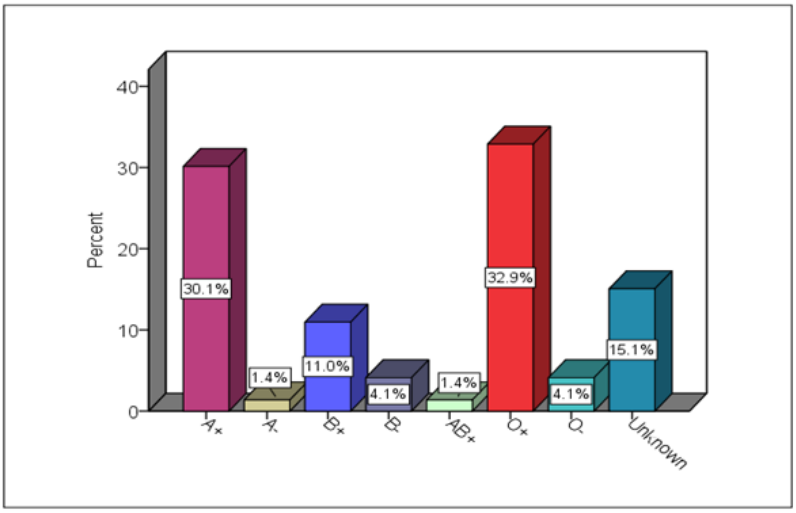

Figure .(2): Percentage of different blood groups in patients with ULs.

The occurrence of ULs among married women was higher in comparison with single ones. The percentage is represented in figure (3).

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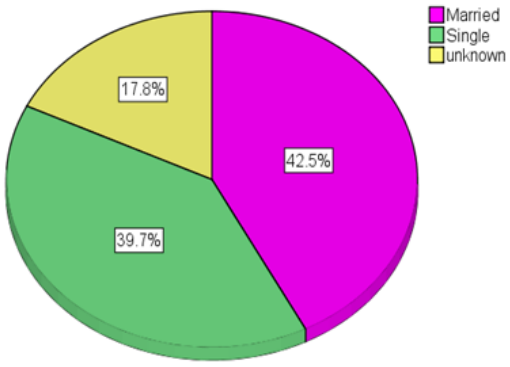

Figure.(3): The distribution of the patients according to thier marital status.

Regarding patient's symptoms, menorrhagia was the common complaint, whereas irregular bleeding and dysmenorrhea occurred with equal percentage. Other complaints represented in table (2). There was a significant correlation between the patient's complaints and different age groups. Menorrhagia, Irregular bleeding, and Pain (pelvic / abdominal) occurred more in age group 41-50 years, while Dysmenorrhea and Infertility were in younger age between 31-40 years as shown in table (2).

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VOLMUE:2 ISSUE:1 June: 2025

Table. (2): The distribution of patients by their complaints and age groups.

Patient`s complaints	Patient's age groups - n (%)					
	21-30	31-40	41-50	51-60	≥61	Total
Menorrhagia	1(2.8%)	10(27.8%)	21(58.3%)	3(8.3%)	1(2.8%)	36(51%)
Irregular bleeding	0(0%)	2(40.0%)	3(60.0%)	0(0%)	0(0%)	5(7%)
Dysmenorrhea	0(0%)	3(60.0%)	2(40.0%)	0(0%)	0(0%)	5(7%)
Pain (pelvic / abdominal)	0(0%)	2(33.3%)	4(66.7%)	0(0%)	0(0%)	6(8%)
Pelvic pain and pelvic mass	0(0%)	0(0%)	0(0%)	0(0%)	1(100%)	1(1%)
Infertility	0(0%)	2(100.0%)	0(0%)	0(0%)	0(0%)	2(3%)
No complaints	0(0%)	1(25.0%)	3(75.0%)	0(0%)	0(0%)	4(6%)
Others	0(0%)	1(33.3%)	1(33.3%)	1(33.3%)	0(0%)	3(4%)
Unknown	1(11.1%)	2(22.2%)	5(55.6%)	1(11.1%)	0(0%)	9(13%)
Total	2(2.8%)	23(32.4%)	39(54.9%)	5(7.0%)	2(2.8%)	71(100%)
P-value	0.023					

Myomectomy was commonly performed type of operation, followed by total abdominal hysterectomy with bilateral salpingo-oopherectomy, then the other types of operation as revealed in table (3).

Table .(3): The distribution of the patients according to the type of operation

Type of operation	Frequency	Percent
Myomectomy	54	74.0
STAH	4	5.5
TAH	3	4.1
TAH+BSO	11	15.1
Unknown	1	1.4
Total	73	100.0

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STAH, Subtotal abdominal hysterectomy; **TAH**, Total abdominal hysterectomy; **TAH+BSO**, Total abdominal hysterectomy with bilateral salpingoopherectomy.

Multiple ULs were more compared to single ones as shown in figure (4).

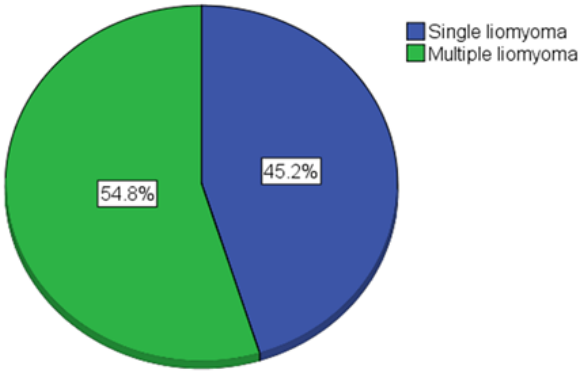

Figure .(4): The percentage of single vs multiple ULs.

The tumor size was available for 71 cases out of 73 cases with a mean of 6.75±4.25 cm (the maximum tumor diameter ranges from 1-20cm) (figure 5).

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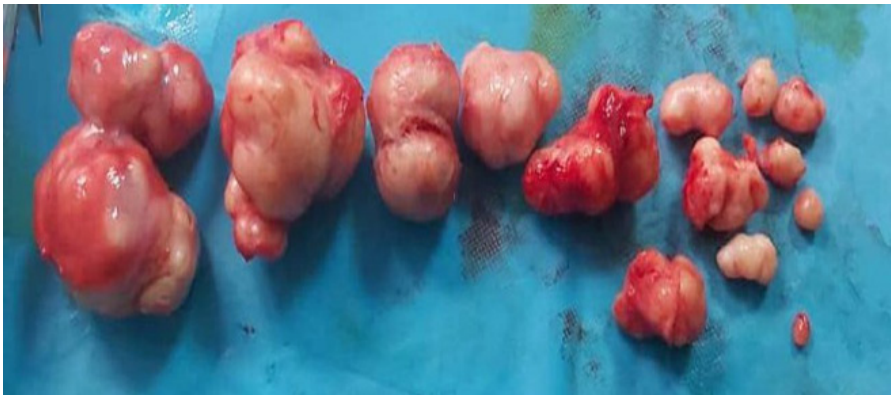

Figure .(5): Variable sized ULs extracted from a uterus diagnosed with multiple leiomyomas

ULs were located in subserosa in eight (11%) cases, submucosal site reported in two (2.7%) cases (figure 6), and four (5.5%) cases were intramural. However, the data about other cases were not revealed in files.

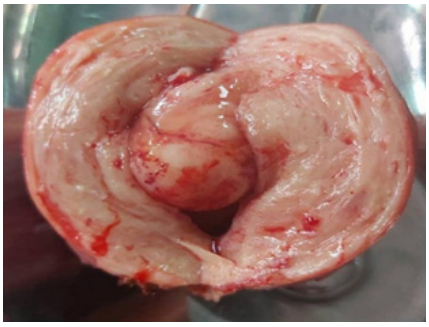

Figure .(6): Gross section of uterus with submucosal leiomyoma.

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The histopathological picture of ULs showed proliferating bundles of smooth muscle cells with connective tissue displays a variable number of blood vessels and fibroblasts, degenerative change was also seen (figure 7a &b).

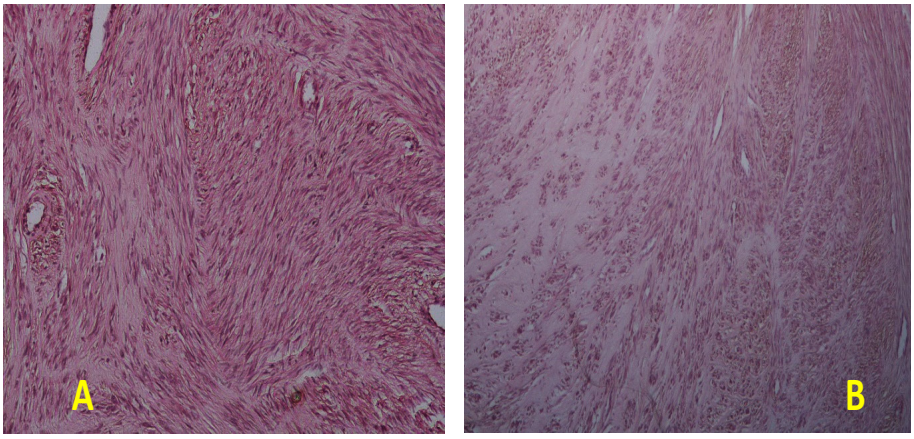

Figure .(7): a. High power view of H&E stained tissue section from UL shows intersecting proliferating bundles of smooth muscle cells with indistinct borders, eosinophilic cytoplasm, and cigar-shaped nuclei; b. Low power view shows homogeneous pale pink area of hyaline degeneration.

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Endometrial hyperplasia was reported in one case, adenomyosis was found in four (5.5%) cases, whereas the ovarian changes were chocolate cyst in five (6.8%) cases and simple cyst in one case.

Discussion:

UL is a benign tumor of smooth muscle that is commonly seen in women of reproductive age group. In this study, the mean age of the patients was 43.31 ±7.31 years with age ranging from 30–74 years, and most of them were in the age group 41–50 years (54.9%). These findings are similar to a study conducted by Bhatta et al. (9). Likewise, a study performed by Priyadarshini showed that the commonly affected age group was 41–50 years (51%), and a study done by Tiwari A. and Sapkota P. revealed the mean age was 44.95±7.36 years with (94%) of patients were between the age of 30–60 years (10,11). Whereas a study performed by Gowri et al. exposed that patient`s age range 26–59 years, with most ULs affected patients aged 31–50 years, representing (90%) of cases (6).

In the present work, there was a statistically significant difference on comparing the mean age of the patients below and above forties. In contrast to this finding a study performed by Ashour et al. which revealed no significant difference between advanced ages compared with the young ages; the below and above forties (12). The method of diagnosis and nature of population understudy and different risk factors may explain different finding (4)

In this work, among cases of known blood groups, ULs were slightly higher in women possessing blood group O+ (32.9%), followed by blood group A+ (30.1%), then blood group B+ (11%). Compared to this, a study done by Ashour et al. revealed that women holding blood

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group O+ (45%) were higher with significant difference from the other blood groups; A+ and B+ representing 28% and 20% respectively (12).

The occurrence of ULs among the married women was higher (42.5%) in this study compared with single ones; in available data, as there are 17.8% of the total cases the marital status was not available. Likewise, data from a study accomplished by Ashour et al. exposed the occurrence of ULs was higher (59.30 %) in married women compared with single and divorced women (12). This may be related to increased gynaecological care during the marital years, and delayed childbirth with family planning that expose women to estrogen for long period (4).

ULs are usually asymptomatic, but can manifest depending on their size, location and hormonal effects. In this study, menorrhagia was the common complaint (51%), followed by irregular bleeding and dysmenorrhea, which occurred with equal percentage. A significant difference in the symptoms within age groups with menorrhagia, Irregular bleeding, and Pain (pelvic / abdominal) occurred more in age group 41–50 years, while dysmenorrhea and Infertility were in younger age between 31–40 years. This came in agreement with studies performed by Gowri et al. and Priyadarshini exposed that menorrhagia was the commonest clinical manifestation followed by pain in abdomen and dysmenorrhea with most affected patients aged 31–50 years (6,10). In the same way, a study performed by Lahori showed that the majority of the patients were between 41–50 years, and the presentation commonly the menorrhagia followed by pain in abdomen and dysmenorrhea (13). A study performed by Ashour et al. exposed that most of the cases were recorded with menorrhagia, which was significantly higher from

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other presentations (12).

In the present work, myomectomy was the commonly performed type of operation (74%) followed by total abdominal hysterectomy with Bilateral Salphingo-oophorectomy. Likewise, data from a study done by Ashour et al. myomectomy was the preferable for patient management (80.9%) than trans- abdominal hysterectomy and other ways of management (12). Comparably, a study done by Da Silva et al. revealed that total hysterectomy was the most frequently performed surgery (94.7%) followed by partial hysterectomy, then myomectomy (14). In addition, a study conducted by Tiwari A. and Sapkota P. revealed that total abdominal hysterectomy with Bilateral Salphingo-oophorectomy was done in (90%) of cases and myomectomy in (10%) of cases (11). Moreover, a study done by Kulkarni et al. exposed that (50%) of patients underwent total abdominal hysterectomy. The least performed operations were myomectomy and vaginal hysterectomy (15).

Multiple ULs (54.8%) were occurred more than single ones in this study, with tumor size ranges from 1-20 cm with mean of 6.75±4.25 cm. The tumor location was available for some cases. The subserosal site was in (11%) of cases and submucosal site reported in (2.7%) of cases. Similarly, a study performed by Tiwari A. and Sapkota P. revealed that multiple leiomyomas were present in (54%) of cases, with tumor size ranges ranging from 0.3 - 22cm (11). In contrast to this finding, a study accomplished by Bhatta et al. and Gowri et al. exposed that most of ULs were single in (80.95%) and (71%) respectively (159,6). The subserosal location was in (13.1%) of cases and submucosal site was in (16.6%) of cases according to data by Bhatta et al. (9). Figures from study by Gowri et al. revealed (48%) of

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cases had intramural fibroid whereas subserosal (16%) submucosal (3%) and (33%) had leiomyomas in more than one location (6). Also, a study done by Priyadarshini and Lahori showed (59%) and (56.95%) of ULs were single, and intramural location was seen in (66.65%) and (57.4%) followed by subserosal location (20.3%) and (30.69%) respectively (10,13). Moreover, the study conducted by Lahori showed the tumor size ranged from a few mm to 13cm (13).

In the current work, the associated changes in patients with ULs; endometrial hyperplasia was detected in one case, and adenomyosis was found in (5.5%) of cases. The ovarian changes were existing as chocolate cyst in (6.8%) of cases and simple cyst in one case. Comparably, a study performed by Gowri et al. exhibited simple endometrial hyperplasia in (22.8%) and ovarian chocolate cyst in (0.8%) of cases (6). A work accomplished by Priyadarshini disclosed that (11%) of the patients had cystic ovaries and (19 %) had adenomyosis (10).

Conclusion:

ULs are benign tumor affects the women in the reproductive and perimenopausal age group, mostly in the fifth decade, the married ones more than the single. The blood group O+ is predominant. Multiple ULs are more than the solitary. The most common mode of presentation is menorrhagia. The myomectomy is the common procedure in the management of ULs.

Limitation of the study: Shortage of the information in the patient`s files

Recommendations:

-The patient`s record files should be designed to contain all informative data for follow up and to be a source of research.

-Regarding study form, further studies of the pathological nature of the disease and research to be con-

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ducted in larger samples using molecular and immunohistochemical studies in order to develop a more comprehensive method for combating the disease.

-Conflicting Interest: there is no conflict

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Doctors' Knowledge and Practice toward Evidence-Based Medicine in Benghazi Teaching Hospitals

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Original Research Article

Abstract

Background: Evidence-based medicine (EBM) is the utilization of the best evidence available from reliable, bias-free clinical trials and the integration of that evidence with the preferences and conditions of the patient. The current study intends to comprehensively evaluate the status of EBM knowledge, attitude, and practice among doctors in Benghazi teaching hospitals because there have been no studies conducted in this field in Benghazi, Libya.

Methods: This cross-sectional study was conducted in August 2023. 129 doctors from teaching hospitals in Benghazi representing a variety of specialties, including medicine, pediatrics, surgery, obstetrics and gynecology (OBGYN), and others, participated in the study. A valid questionnaire that could be self-administered served as the data collection tool. Cronbach's alpha was used to evaluate the questionnaire's internal consistency.

Results: The study showed that 64.3% of the participated doctors had heard of EBM. The overall level of knowledge was relatively low. In general medicine doctors demonstrated more knowledge about EBM than other specialties, and more aware of the term of EBM than the other participants. Medicine specialty doctors had the highest score in knowledge, whereas paediatricians had the lowest score. Pediatricians were less likely to hear of the term EBM compared to medicine doctors, odds ratio: 3.83 (95% CI, 1.45 – 10.11), p-value: 0.007, and had less knowledge about EBM, p-value of 0.037.

Conclusion: The study indicates that while most participants have a positive attitude towards EBM, they have limited understanding. To improve EBM practice and accessibility, an electronic library with online databases should be established, and EBM training programs should be included in undergraduate and postgraduate curricula.

Keywords: Evidence-based medicine, EBM, Knowledge, Attitudes, Practice, Libya, KAP.

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Introduction:

Evidence-based medicine (EBM) is a method that combines the best available research evidence with clinical expertise and patient values to guide informed healthcare decision-making. It has gained significant attention in recent years to improve the quality of patient care and outcomes.[1,13]

In 1972, Professor Archie Cochrane emphasized that many treatment decisions lacked a foundation in systematically reviewed clinical evidence. He advocated for international collaboration among researchers to conduct comprehensive reviews of the best clinical trials within each medical specialty. This approach exposed the disconnect between research findings and clinical practice and began to persuade healthcare professionals of the value of an evidence-based approach. The term of evidence-based medicine was formally introduced in 1991 by Gordon Guyatt and his team, aiming to move clinical decision-making away from 'intuition, unsystematic clinical experience' to scientifically sound, clinically relevant research. In 1996, D.L. Sackett of McMaster University in Ontario, Canada, further defined evidence-based medicine as the integration of the best available research evidence, clinical expertise, and the individual patient's values and circumstances. [7,12]

Implementing EBM involves these five fundamental steps: (1) Defining the problem, which involves generating a related and searchable clinical question that is consistent with the disease's form. (2) Searching databases and resources for important clinical papers to get the best evidence. (3) Critically evaluating the evidence for validity and usefulness. (4)

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Using information and evidence in clinical practice. (5) Assessing the usefulness and efficacy of the use of such evidence. [2,3]

One of the core principles of evidence-based medicine (EBM) is the hierarchy used to evaluate the strength of evidence on which decisions are based. This principle stresses the importance of judging the quality of evidence before acting on it. Evidence is ranked in this hierarchy according to its susceptibility to bias. At the top are meta-analyses of multiple randomized controlled trials, as these are designed to minimize bias and reduce the likelihood of systematic errors. In contrast, evidence such as expert opinions or case series ranks lower, as it is more prone to bias from the author's personal views and often does not account for confounding variables.[4] The advantages of EBM include assisting doctors in managing information overload, distributing healthcare resources more fairly, reducing healthcare costs, and defending public treatment decisions. [5]

Using the Grading of Recommendations Assessment, Development, and Evaluation (GRADE) system to rate the strength of recommendations and the quality of evidence in systematic reviews, as well as clinical practice guidelines that address alternative management options, are examples of modern EBM principles. The GRADE process starts with a question specifying all the important outcomes, then provides criteria for evaluating evidence quality, including study design, bias risk, imprecision, inconsistency, indirectness, and effect magnitude. Recommendations are classified as either strong or weak based on the quality of the supporting evidence and the trade-off between

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the benefits and harms of different management options. The GRADE system advises presenting this evidence in clear, concise, and informative summary of findings tables, which outline both the quality of the evidence and the magnitude of relative and absolute effects for each key outcome. Additionally, evidence profiles may provide detailed explanations for how the quality ratings were determined.[11]

By creating reliable standards and guidelines and evaluating their performance against them, health systems today attempt to raise the caliber of healthcare services [15]. Additionally, applying research findings to clinical practice is a means of broadening the scientific foundation and expertise of those who specialized in the topic. [16] Research findings can be used to replace outdated and unreliable practices with safe and dependable practices , which will raise healthcare standards and improve the quality of services rendered by medical personnel. Therefore, the best evidence for "evidence-based decision-making" must be accessed in order to implement best practices that guarantee the clinical effectiveness of healthcare services.[17]

This study sought to identify the levels of knowledge and practice of EBM among teaching hospital physicians in Benghazi, Libya.

In addition to Evaluate the impact of the related factors on knowledge and practice, of EBM.

This study, in our opinion, can contribute to the development of strategies for encouraging clinicians to use EBM and eventually enhance patient outcomes. Knowing the elements that affect EBM adoption can also help with the creation of focused interventions and training programs for health-

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care personnel.

Methods:

Analytic cross-sectional study was used for this research. Held during August 2023, at Benghazi teaching hospitals (Benghazi Medical Center, Benghazi Children Hospital, and Alhawary Cardiac Center, Aljalaa Hospital).

According to the following inclusion criteria, the study's subjects were doctors working in Benghazi teaching hospitals as senior house officers (SHOs), specialists, or consultants in various departments (medicine, surgery, pediatrics, and other specialties). Doctors who were on vacation at the time the data was being collected and doctors who did not want to participate were excluded from the study.

A self-administered questionnaire was used to gather information from doctors. A reliable and valid questionnaire was adopted. [14] It includes questions about the following:

1. Socio-demographic information.
2. Physician's knowledge about EBM (concept, relevant databases, and study designs)
3. Physicians' attitudes towards evidence-based medicine
4. Questions about the application of EBM.
5. Considered important obstacles to using EBM in clinical practice.

The variables included in the questionnaire were gender, medical specialty, position, and years of experience, and the questionnaire also asked about any previous training or education on EBM. Additionally, the questionnaire assessed the level of familiarity with different databases used for EBM research as "Aware" = 1, "Unaware" = 2, as well as the understanding of the technical terms used in EBM as "It would

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not be helpful for me to understand" = 1, Don't understand but would like to" = 2, "Some understanding" = 3, "Understand and could explain to others" = 4. and a score was generated for each subject with a min score of 14 and max score of 56.

The practice of evidence-based medicine in clinical practice were measured using a five-point Likert scale of "Strongly Agree" = 5, "Agree" = 4, "Neutral" = 3, "Disagree" = 2, "Strongly Disagree" = 1. And a score for each was generated. As for practice, the min is 8 and the max is 40.

SPSS version 26 was use for data management and analysis. The frequencies of different variables were shown using frequency tables. Additionally, descriptive statistics such as means, and standard deviations were calculated to summarize continuous variables. The internal reliability of the questionnaire was determined using Cronbach's alpha coefficient. To assess the association between the independent and dependent variables, univariable and multivariable logistic regression analyses, as well as multiple linear regression analysis were conducted.

Due to small numbers of cases in some categories and to obtain more stable logistic regression models, the obstetrics and gynecology (OBJYN) and other categories specialties were collapsed together in one level, also consultant and specialists categories were re-categorized into one variable named senior versus junior (SHOs). No evidence of multicollinearity was detected in all multiple regression models.

A p-value of less than 0.05 indicates that the association is significant.

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The ethical aspects of this study involved coordination with appropriate authorities, hospitals, and the university; securing informed consent from participants; and ensuring the confidentiality of their personal information.

Results:

A total of 129 doctors have responded to the questionnaire. Of them, 25.6% were males (n = 33) and 74.4% were females (n = 96). Internal reliability analysis was used to verify the validity of the questionnaire, and the results showed that the knowledge and practice domains had Cronbach's alpha values of 0.93 and 0.84, respectively.

Medicine had 33.3% (n = 43) of the doctors, surgery had 17.1% (n = 22), pediatrics had 34.1% (n = 44), OBGYN had 3.9% (n = 5), and other specialties had 11.6% (n = 15). The majority of the doctors (n = 89, 69%) were SHOs, (n = 32, 24.4%) were specialists, and (n = 8, 6.2%) were consultants (Table 1).

Table.(1): Demographic characteristic of the participants

Variable	Variable level	Number (%)
Gender	Male Female	33 (25.6) 96 (74.4)
Specialty	Medicine Surgery Pediatrics OBGYN Other	43 (33.3) 22 (17.1) 44 (34.1) 5 (3.9) 15 (11.6)
Position	SHO Specialist Consultant	89 (69) 32 (24.8) 8 (6.2)

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The means and standard deviations of knowledge and practice scores were 39.31 (9.13) and 29.65 (7.01), respectively (Table 2).

Table .(2): Descriptive statistics for knowledge and practice scores

	Knowledge	Practice
Min score	14	8
Max score	56	40
Mean	39.31	29.65
Std. Deviation	9.13	5.94

multivariable logistic regression analysis' dependent variable EBM awareness, responding (no/yes) to the question (Have you heard of the term "evidence-based medicine")? The independent variables were gender, specialty, and position. Female doctors were more likely not hearing of the term EBM compared male doctors, the adjusted odds ratio of 3.17 (95% CI, 1.06 – 9.45), p-value 0.038. In terms of specialty, pediatric doctors had more odds of not hearing of the term EBM compared to medicine doctors, with an odds ratio of 3.83 (95% CI, 1.45 – 10.11), p-value 0.007. For surgery and OBJYN/ Others, the adjusted odds ratios were 1.28 (95% CI, 0.36 – 4.58), p-value 0.70, and 2.30 (95% CI, 0.70 – 7.55), p-value 0.17 respectively (Table 3).

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Table.(3): Logistic Regression Models for Knowing EBM term

	Univariable[a]		Multivariable[b]	
	Crude OR (95% CI)	P-value	Adjusted OR (95% CI)	P-value
Gender Male (reference) Female	4.17 (1.48 – 11.74)	0.007	3.17 (1.06 – 9.45)	0.038
Specialty Medicine (reference) Surgery Pediatric OBJYN and Other specialties	1.11 (0.32 – 3.83) 4.53 (1.76 – 11.65) 2.52 (0.80 – 8.01)	0.86 0.002 0.12	1.28 (0.36 – 4.58) 3.83 (1.45 – 10.11) 2.3 (0.70 – 7.55)	0.70 0.007 0.17
Position Junior (reference) Senior	0.95 (0.44 – 2.10)	0.92	1.03 (0.43 – 2.47)	0.95

[a]Univariable logistic regression

[b]Multivariable logistic regression includes gender, specialty and position

Abbreviations:

OR, odds ratio; CI, confidence interval

The results of the Multiple linear regression analysis on knowledge domain showed that doctors of medicine specialty had more knowledge than other specialties, higher scores of 3.38 (p-value 0.13), 4.54 (p-value 0.037), and 4.56 (p-value 0.84) compared to doctors of surgery, pediatrics and OBJYN/Other, respectively. No notable difference in knowledge by gender and position. (Tables 4). Likewise, in the practice domain, no remarkable differences in practice in terms of gender specialties nor in position (Tables 5).

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Table.(4): Multiple linear regression analysis of EBM knowledge domain.

Variable	β coefficients	Standard errors	P-value
Gender Male (reference) Female	0.42 (- 4.06 – 4.14)	2.07	0.98
Specialty Medicine (reference) Surgery Pediatric OBJYN and Other specialties	- 3.83 (- 8.84 – 1.20) - 4.54 (- 8.62 – - 0.28) - 4.56 (- 9.675 – 0.62)	2.53 2.10 2.62	0.13 0.037 0.84
Position Junior (reference) Senior	1.21 (- 2.64 – 5.06)	1.94	0.92

Table.(5): Multiple linear regression analysis of EBM practice domain

Variable	β coefficients	Standard errors	P-value
Gender Male (reference) Female	- 1.72 (- 4.29 – 0.83)	1.30	0.18
Specialty Medicine (reference) Surgery Pediatric OBJYN and Other specialties	0.70 (- 2.52 – 3.92) 2.06 (- 0.56 – 4.68) 0.27 (- 2.94 – 3.49)	1.62 1.32 1.62	0.67 0.12 0.86
Position Junior (reference) Senior	- 1.73 (- 4.10 – 0.62)	3.92	0.15

Discussion:

This study found that 64.3% of the participants had heard of EBM. While a comparable survey conducted in Sudan (2010) by Zeidan A. Z et al. found that only 15% of the sample had heard of it, [9] About 87% of the participants in a different survey conducted in Sri Lanka (2008) by Chrishantha Abeysena et al. had heard of it. [10]

Our study revealed no significant correlations between gender and knowledge scores, which was in line with findings from a different study by Mojgan Javedani Masroor et al. that was carried out in Iran (2024).[18] This study also demonstrated that Medicine doctors are more generally aware of the term EBM and have more knowledge than other

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specialties, however the overall level of EBM knowledge was relatively low. Among the participants, medicine doctors demonstrated the highest level of knowledge regarding (EBM), whereas pediatricians had the lowest scores, in contrast to a study done in Damascus, Syria (2022) by Muhammad Nour et al., where pediatricians achieved the highest score in practicing EBM. [8]

A cross-sectional study conducted in Egypt (2019) by Amira Abdel-Kareem et al. found that the most commonly used resources " used in decision making" were PubMed 61.3%, the Cochrane Database of Systematic Reviews 10.1%, and EBM from the BMJ Publishing Group 5.5% 19, whereas Mukhtiar Baig et al. conducted another study in Saudi Arabia (2016). revealed that while just 8.5% and 7.7% of participants used the Cochrane Database of Systematic Reviews and Best Evidence Review, respectively, over half of them (48.7% and 47.9%) were aware of it. The New England Journal of Medicine was the most "frequently" read journal 31.6%, followed by the British Medical Journal 12.0%, while the least accessed journals were the Lancet 3.4% and the Middle East Medical Journal 3.4%%.[20]

Nearly 69.3% of doctors were aware of "Up-to-date" and used it in clinical judgements, according to a different study done in Al-Kuwait (2021) by Iman Qadhi et al., while 27% of doctors were aware of "JAMA Evidence.".21 The mean scores of knowledge and practice in our study were 60.26% and 67.65%, respectively; this was slightly lower than Muhammad Nour et al. (2022), in which the mean scores were 59.2%, 74.3%, and 53.9%, respectively. [8]

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Our results indicated that there was no agreement between knowledge and practice, as medicine doctors have higher EBM knowledge than other specialties, however there were no differences in practicing EBM among different specialties.

The study shed a light on the important topic of EBM among Libyan doctors at teaching hospitals in Benghazi, providing deeper understanding of different aspects of EBM. Additionally, in order to improve the accuracy of our results, we also carried out a multivariate analysis and controlled for other factors.

The study has limitations, one it was conducted as a cross-sectional study, it restricts our ability to infer causal relationships or observe changes over time. Another limitation of our study is the convenience sample and the non-standardized data collection procedure. This may have introduced bias or inconsistency in the way the data was collected, potentially affecting the accuracy and reliability of our results. Furthermore, the relatively limited sample size in our study reduces the statistical power and the extent to which our findings can be generalized. It is possible that a bigger sample would have provided more reliable and representative results. Additionally, the small sample size may have restricted our ability to detect relevant effects that could be present in a larger population.

Conclusion:

The results of this study indicate that while the majority of participants hold a positive attitude toward evidence-based medicine (EBM), their understanding of the concept remains limited. An electronic library with a subscription to online databases should

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be set up to ensure excellent EBM practice and to make them easier for students and doctors to access. EBM training programs should be made available to doctors and included in the undergraduate and postgraduate curricula in order to ensure the effective application of EBM in everyday practice.

Conflict of Interest Statement:

The Authors declare that they have no conflicts of interest related to this study

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The prevalence of dental caries among Schoolchildren in a sample of schools in Ajdabiya City; A cross-sectional study

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Original Research Article

Abstract

Background: Dental caries is an infectious microbiological disease of the teeth that results in localized dissolution and destruction of the calcified dental tissues. It remains one of the most prevalent pathological conditions among children in most countries. Preventive measures are the cornerstone of successful treatment for dental caries in children.

Aims: The aim of this study is to determine the prevalence of caries among schoolchildren in the city of Ajdabiya and to lay the foundation for future awareness and educational programs on oral and dental health. These initiatives aim to prevent early tooth loss resulting from dental caries.

Methods: This observational cross-sectional study was conducted among 690 schoolchildren (both female and male) in six randomly selected government schools in Ajdabiya city, located in north-eastern Libya. A clinical examination was performed on the children. If caries were detected, a mark was placed next to the symbol representing the affected tooth on a designated recording sheet, according to the age groups targeted in the study. Data were analyzed using SPSS version 25.

Results: The prevalence of dental caries among the study population was high, at 84%, with the highest rates observed among 9- and 10-year-old children—95% and 94%, respectively.

Conclusions: Dental caries is considered a highly prevalent public health problem among children worldwide. This study highlights a high prevalence of dental caries among schoolchildren in Ajdabiya city, correlating with the mixed dentition stage—a phase in which permanent teeth have erupted while primary teeth are still present.

key words: Dental caries, infectious, microbiologic, Ajdabiya, prevalence, educational programs, cross-sectional study, mixed dentition.

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Introduction:

Dental caries is an infectious disease [1] caused by acidophilic bacteria capable of producing a sufficiently acidic environment (pH below 5.5) [2] as a by-product of fermenting food residues accumulated on the tooth surface. This acidic environment leads to the demineralization of the tooth structure. Four essential factors must be present simultaneously for dental caries to develop: cariogenic bacteria, a susceptible tooth surface, a source of fermentable carbohydrates (especially sugar-containing foods) to support bacterial growth, and adequate time for the bacteria to metabolize these carbohydrates and produce acid.

Several bacterial species are implicated in the formation of dental caries, with Streptococcus mutans being the most common cause. S. salivarius and Actinomyces species have been associated with root caries, while Lactobacillus species are often involved in fissure caries [3].

The lack of health education and preventive measures in schools contributes to the high prevalence of dental caries, negatively impacting children's overall health. If left untreated, caries can cause localized pain, infection, early loss of primary teeth, malocclusion, and speech disorders. Additionally, improper chewing of food can lead to digestive problems and poor absorption of essential vitamins and minerals necessary for a child's growth and health, ultimately affecting academic performance.

Material and Methods:

A cross-sectional study was conducted among a representative sample of schoolchildren aged 7 to 15 years from six randomly selected government

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schools in Ajdabiya city. The study involved four dentists and three dental assistants and was part of a medical awareness campaign carried out by the Diabetes Clinic Center in Ajdabiya in March 2024. Permission and approval for the study were obtained from the center's manager and the city's education office.

Before the dental examinations began, classroom teachers were informed of all relevant details regarding the study through an official letter sent from the health center administration to the administrations of the participating schools. The children were informed that their teeth would be examined, and participation was entirely voluntary.

Dental examinations were conducted on 690 children across the six schools. Age information was obtained directly from the students. The clinical examinations were performed using a mouth mirror and probe under natural daylight, with each child seated in an ordinary chair with a backrest. Cases of caries were recorded during the examinations. Following the assessments, the medical team educated the children about the severity of dental caries and its impact on general health. They also demonstrated proper toothbrushing techniques and discussed foods that are harmful or beneficial to oral and dental health as part of the awareness campaign. The collected data were categorized into subgroups based on the children's ages, and statistical analysis was subsequently performed.

Results:

Table (1) shows the prevalence of dental caries among the study sample according to the children's age. The overall caries prevalence was high at 84% (n =

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579). The highest caries prevalence was recorded among 9-year-old children at 95% (n=83), while among 14-year-old children, the prevalence was 64.7% (n=34).

Table.(1): The prevalence of dental caries according to the age of children

Age	Number of children examined	Percent of total group	Number of children with Dental caries	Prevalence
7 years	87	12.6%	72	83 %
8years	132	19.1%	120	91%
9years	83	12.1 %	79	95 %
10years	65	9.4%	61	94 %
11year	80	11.6%	66	82.5%
12year	112	16.2%	82	73.2%
13year	51	7.4%	39	76.5 %
14year	34	4.9%	22	64.7 %
15year	46	6.7%	38	82.6 %
Total	690	100%	579	84%

Table (2) shows the prevalence of dental caries in the primary and permanent teeth according to the palmer tooth Numbering system, which numbers permanent teeth from 1to 8 and primary teeth from A to E . The table reveals that the highest prevalence of dental caries was found in primary and permanent molars (D,E and 6), which rates 48%, 44% and 55%, respectively.

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Table.(2): The number and prevalence of caries in primary and permanent teeth according to the age and tooth classification.

Age In years	Number Of children with dental caries	frequency of dental caries in primary and permanent teeth, categorized by tooth type											
		A	B	C	D	E	1	2	3	4	5	6	7
7	72	18	16	24	65	48						7	
8	120	13	12	24	94	81						31	1
9	79	7	7	19	53	45	2	1		5	3	33	
10	61	1		9	36	39	1		2	1	4	41	1
11	66			4	11	19		1		5	13	50	6
12	82			6	16	17	2	2	4	1	9	68	8
13	39				1	5			1	1	9	38	3
14	22				1	1	3	3	5	5	5	19	6
15	38					1	1	1	2	3	10	33	13
%	84%	7%	6%	15%	48%	44%	2%	1%	2%	4%	9%	55%	7%
Total	579	39	35	86	277	256	9	8	14	21	53	320	38

Explanation of symbols in the table 2:

A: Primary central incisors.

B: primary lateral incisors .

C: primary canine.

D and E: primary molars.

1 and 2: permanent central and lateral incisors.

3: permanent canine.

4 and 5: permanent premolars.

6 and 7 : permanent molars.

Empty square : No caries frequency in this tooth type among this age group.

%: The prevalence of dental caries.

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Discussion:

The carious process involves metabolic activity within the dental biofilm. Diet plays a significant role in this process, as bacteria in the biofilm ferment suitable dietary carbohydrate substrates to produce acid, causing the plaque pH to drop within 1–3 minutes. Unfortunately, the plaque remains acidic for an extended period, taking 30–60 minutes to return to its normal pH of approximately 7 [4]. It is believed that the lower incidence of dental caries in areas with fluoridated water is due to fluoride's continuous environmental effect on the teeth, reducing enamel solubility and promoting remineralization. Moreover, optimal fluoride exposure during tooth development positively influences the structure of developing teeth [5].

The prevalence of dental caries among schoolchildren varies significantly across different geographic locations in Libya. A cross-sectional study conducted in Benghazi in 2020 among 791 children aged 12 years from 36 elementary schools found a caries prevalence of 57.8% [6]. Another study in Tripoli (2021) investigated caries prevalence and associated factors among 1,934 schoolchildren aged 6 to 12 years. The results showed a prevalence of 78% among first-grade students (6–7 years, n = 1,000) and 48.2% among second-grade students (11–12 years, n = 934) [7]. In Misurata, a cross-sectional study of 322 children aged 3–13 years revealed that 75% of children aged 3–6 years had decayed primary teeth, while only 16.5% of those aged 7–13 years were affected [8]. Additionally, a study conducted in Masallata between October 2018 and May 2019 among 340 children aged 6–12 years found that

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the prevalence of dental caries was 63.5%, with 36.5% showing no signs of caries [9]. In Sebha, a city in southern Libya, a study among 572 schoolchildren aged 6 to 14 years reported a dental caries prevalence of 77.27% [10].

Globally, dental caries remains a common health issue. A cross-sectional study in Damascus, Syria, among 1,500 children aged 8–12 years reported a prevalence of 79.1% [11]. In Egypt, a study involving 369 children aged 3–18 years found a prevalence of 74% [12]. Another study in Riyadh, Saudi Arabia, among 578 primary school children aged 6–8 years from 12 schools showed that 83% had dental caries [13]. In Huizhou city, China, a study conducted from March to May 2022 among children aged 3–5 years reported a prevalence of 73% [14].

In this study, the prevalence of dental caries was 84%. As shown in Table 1, the highest prevalence was among children aged 9 years (95%), while the lowest was among those aged 14 years (64.7%). These findings suggest a need to focus on children in this age group by providing training and raising awareness about oral hygiene, as well as implementing preventive measures to reduce caries rates. Furthermore, investigating the causes of dental caries within school settings and increasing the frequency of annual awareness campaigns are crucial and beneficial steps.

According to Table (2), the primary molars and the first permanent molars exhibited the highest prevalence of dental caries. This is attributed to their deep anatomical grooves and pits, which promote food stagnation and increase the risk of caries development—especially in the absence of proper oral hygiene.

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During the transitional years (ages 7 to 13), many children experience the eruption of all four first permanent molars and the exfoliation of primary central and lateral incisors [15]. Consequently, the occlusal surfaces of permanent molars are particularly susceptible to caries during this period due to their posterior location in the dental arch, which often makes brushing difficult for children. Additionally, the immature enamel surface of newly erupted permanent molars increases their vulnerability to cariogenic bacterial invasion [16]

The Recommendation:

This study demonstrated a high prevalence of dental caries among schoolchildren in Ajdabiya city. Therefore, it is essential to implement periodic oral health education programs throughout the year, alongside regular dental examinations in schools to detect untreated carious lesions early and reduce the overall prevalence of dental caries. Early preventive measures should also be prioritized, such as the application of fissure sealants and fluoride varnishes—particularly for children with active coronal or root caries—ideally administered twice a year.

Additionally,providing educational materials and training teachers to incorporate oral health education into the school curriculum would be highly beneficial. Encouraging children to follow a healthy diet and reduce their sugar intake also plays a crucial role in maintaining good oral health. Moreover, parents or caregivers should brush their children's teeth until the children are capable of doing so independently and should continue to supervise and assist with brushing at least twice daily.

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Conclusion:

Dental caries and their sequelae can affect children's physical growth, self-esteem, and social development due to missing, discolored, or damaged teeth. The objective of this study was to collect and provide baseline data on the prevalence of caries, which will serve as a foundation for evaluating future school-based oral health programs.

Furthermore, these findings highlight the need for targeted oral health interventions and educational programs to reduce the burden of dental caries among schoolchildren in Ajdabiya, ultimately improving their overall health and well-being

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Prevalence and Predictors of Polypharmacy and Medication Adherence among Elderly Patients in Benghazi - Libya.

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Original Research Article

Abstract

Background: Polypharmacy is the simultaneous use of five or more prescription medications and its global prevalence is estimated to be 37% and even higher among the elderly. Variable factors could lead to polypharmacy; either related to health-care providers or patients. It is often associated with several negative health and economical outcomes, especially among older patients.

Aim: To assess the prevalence and factors associated with polypharmacy and medication adherence among elderly patients in Benghazi, Libya.

Method: It is a descriptive cross-sectional study that was conducted for a period of five months among elderly patients in Benghazi. The data from 100 subjects was collected through a face-to-face interview using a questionnaire that consisted of two main domains; demographic data (e.g. gender, age, nationality) and clinical data (e.g. number of drugs taken regularly, self-medication, level of drug compliance).

Results: Polypharmacy was observed in 32% of the cases and it was associated with some factors such as older age, certain types of marital status, lower education level and recent hospital/emergency admission. Most of the participants scored low (67%) for the Morisky medication adherence scale followed by medium (21%) and high scores (12%), respectively.

Conclusion: Elderly patients in Benghazi frequently used five or more prescription medications at the same time and mostly did not adhere well to their treatment regimens. These problems could be addressed through several strategies such as continuously assessing patients' medication regimens and providing extensive patient education.

Keywords: polypharmacy, medication adherence, elderly, Benghazi, comorbidities.

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Introduction:

Although medications are fundamental in improving patients' health and their quality of life, inappropriate prescribing and the use of multiple drugs may have adverse outcomes [1]. Polypharmacy is currently one of the major prescribing difficulties in general practice [2]. There is no formally accepted definition for polypharmacy but most commonly it is defined as the regular use of 5 or more medications at the same time [3, 4]. However, polypharmacy is not always confined to the use of a certain number of drugs as the administration of more medications than are clinically needed could be also considered as polypharmacy [5].

Polypharmacy is a global issue and its prevalence is estimated to be 37%, but among the elderly, those aged ≥ 65 years, it is believed to be much higher reaching even 44.2–57.7 % [6]. In 2019, the number of people aged 65 years or over worldwide were 703 million and in 2050 this number is projected to double to 1.5 billion, with a more prominent increase in developing countries [1]. Currently, China has the largest elderly population in the world and a recent meta-analysis showed a high prevalence of polypharmacy (48%) among elderly Chinese patients and that polypharmacy was significantly associated with potentially inappropriate medication use [7]. Polypharmacy is a major health concern for particularly elderly patients due to altered drug effects associated with old age. These changes could be attributed to variable factors such as different drug distribution and pharmacokinetics (e.g., decreased lean body mass, reduced liver mass and blood flow, elevated

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body fat percentage and lowered renal function), altered response to drugs (e.g., change in receptor properties, influence of associated diseases, impaired sensitivity of homeostatic mechanisms), in addition to social and economic issues (e.g., multiple drug therapy, financial constraints, non-compliance) [8].

Several factors could be the reason for polypharmacy; attributed to either health-care providers or patients. As regards health-care providers, it has been demonstrated that the number of drugs prescribed to patients increases with the number of physicians seen and the number of pharmacies visited. Furthermore, it has been found that when a physician, pharmacist or nurse reviews a patient's medications, the recommendation to stop taking a drug is the one that is least likely to happen. Each of these elements increases the patient's risk of ineffective polypharmacy [9] together with other possible factors such as careless physician prescribing and failure to follow-up patients [10]. Moreover, the elderly are usually subjected to medication side effects because the information they receive from their physician on proper drug use is less compared to patients 20–64 years of age [3].

Patient demographics also have a significant impact on polypharmacy. For example, having lower education levels, being female, advanced age and living in non-urban areas have been found to increase the likelihood of inappropriate polypharmacy [9].

In addition, due to their multiple morbidities, older patients often require various pharmacological treatments and patients usually pressure their physicians to

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prescribe a medication and/or self-medicate with over-the-counter pharmaceuticals.Medication borrowing from friends and relatives is an additional reason for the high prevalence of polypharmacy especially among the older population [10]. The elderly frequently think that there is "a pill for every ill" [9].

While polypharmacy may be unavoidable in certain situations, for most patients it appears to be inappropriate and unnecessary [11]. Studies have associated polypharmacy with several negative health and economical outcomes and was considered a significant indicator of potentially inappropriate medication use [1]. For example, falls particularly when the medications are related to cardiovascular conditions, drug side effects, an increase in hospital admission rates and mortality are all related to polypharmacy [4]. Polypharmacy has also been linked to an increased risk of adverse medication reactions, drug-drug interactions, and drug-disease interactions in patients [12].

Due to their comorbidities, hence, complex prescription regimens, failure to drug compliance is common among senior patients compared to younger populations; elderly usually stick to only 3 out of every 4 of their prescription medications[5].

Medication adherence, also known as drug compliance, is the extent to which a person's behavior agrees with the medication regimen from a health care provider, if not practiced optimally as a result of polypharmacy, for example, it could result in frequent physician and hospital visits. This would consequently lead to the deterioration of the patient's medical condition, decrease the therapeutic benefits,

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elevate health care expenditure and even over treat certain medical conditions [13].

Some medications, when used by older adults, have higher risk of adverse effects and their harm may outweigh the clinical advantages leading to drug interactions, adverse drug events, functional and mental decline, unplanned hospitalization, morbidity and mortality. These drugs are known as potentially inappropriate medications [1] and studies have revealed that the use of multiple medications increases the risk of inappropriate prescribing, particularly the risk of these medications, and the risk of dangerous drug interactions that they may cause [5].

The presence of polypharmacy itself, however, is not always associated with inappropriate or incorrect use of medications, because older adults with comorbidities typically require several medications to manage their multiple health conditions. For instance, three medications are usually needed to control blood pressure or manage symptoms of heart failure according to national guidelines, and type 2 diabetic patients often require at least two different medications to effectively control their blood glucose levels [10].

Despite the fact that polypharmacy is a critical health issue, only a limited number of studies have assessed it among older patients in developing countries, including Libya [1]. Therefore, the aim of this study was to assess the prevalence and factors associated with polypharmacy and medication adherence among elderly patients in Benghazi, Libya.

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Method:

Study design and setting:

It is a descriptive cross-sectional study that was conducted for a period of five months (Feb-June 2024) in Benghazi; the second largest city in Libya with an approximate population of 750,000. All elderly patients (≥ 65 years) from both genders and all social backgrounds were recruited to participate in the survey. As there were no official records of the exact number of elderly in Benghazi, only 100 patients from different places including pharmacies, polyclinics and hospitals participated in this study. Prior to collecting the gross data, the questionnaire was pretested using a pilot study with ten participants.

Study tool and data collection:

The data was collected through a face-to-face interview using a questionnaire that was adapted from a number of similar studies previously conducted in other countries [4, 11, 12, 14-17]. The questionnaire was designed in English and the interviewer was present during the entire time of the questionnaire administration for any needed clarification. A thorough explanation of the study's aim was given to the participants prior to data collection in order to obtain their consent. All subjects were informed that their participation is completely voluntary and that their responses will remain confidential and anonyms.

The questionnaire consisted of two main domains that covered the demographic and clinical data of patients. Subjects' demographics included their gender, age, nationality, marital status, level of education (low, medium and high) and work status. The clinical data comprised of questions related

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to their medical conditions, self-medication, prevalence of polypharmacy (taking five or more medications on a regular basis), recent emergency admission and the level of adherence to prescribed medications.

The Morisky medication adherence scale (MMAS-8) was used to measure the level of medication adherence. It consists of 8 questions regarding common medication-taking behaviors leading to the omission of drugs and the circumstances surrounding adherence behavior. A binary scoring system (yes/ no) was used for the first seven questions while a 5-point Likert scale was used for the final item which assessed the frequency patients forget to take their medications (always= 0, usually= 0.25, sometimes= 0.5, once in a while= 0.75 and never= 1). The total score is a summation of all MMAS-8 items and ranges between 0 and 8, with scores of < 6 reflecting low adherence, 6 to < 8 reflecting medium adherence and 8 reflecting high adherence [18, 19].

Statistical analysis:

The data was entered in Excel sheets and then analyzed using Statistical Product and Service Solutions (SPSS, version 21). Descriptive statistics, chi-square and curve estimation using linear regression tests were performed and the results were presented as means, frequencies, percentages and p-values, and then displayed as tables and figures. A p-value of < 0.05 was considered statistically significant.

Results:

Of the 100 elderly subjects surveyed in this study (Table 1), more than half were males (59%) and the majority were Libyan (90%) and aged between 65-74 years (86%). Participants who

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are married predominated the study population (70%) compared to divorced/ widowed (29%) and single (1%) participants. Additionally, almost half of the subjects had medium level of education while more than one-third had low level and only 14% had high level of education. Seniors who are still working had the highest participation in the study (38%) in contrast to retired (32%) and housewife/ never worked (30%) patients. Approximately two-thirds of the subjects regularly visited a hospital for check-ups, and took medicines to help with certain health conditions without consulting a doctor (i.e. self-medicated). In addition, almost one-third of the subjects had been recently admitted to the hospital and also took five or more medications on a regular basis (i.e. polypharmacy). Most of the participants scored less than 6 for the MMAS-8 (67%), followed by medium (21%) and high scores (12%).

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Table.(1): Distribution of the study population based on socio-demographic factors, polypharmacy, and related factors.

Variables	Categories	N	%
Gender	Male	59	59
	Female	41	41
Age	65-74 years	86	86
	75-84 years	10	10
	≥ 85 years	4	4
Nationality	Libyan	90	90
	Non-Libyan	10	10
Marital status	Married	70	70
	Divorced/widowed	29	29
	Single	1	1
Education level	Low	35	35
	Medium	51	51
	High	14	14
Work status	Working	38	38
	Retired	32	32
	Housewife/never worked	30	30
Regular hospital check-ups	Yes	63	63
	No	37	37
Self-medication	Yes	64	64
	No	36	36
Recent hospital/emergency admission	Yes	32	32
	No	68	68
Polypharmacy	None	68	68
	Polypharmacy	32	32
MMAS-8 score	Low (< 6)	67	67
	Medium (6 to < 8)	21	21
	High (8)	12	12

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Continuous Variables			Mean
Number of chronic conditions			3.08
Number of drugs taken regularly			3.79
MMAS-8 score			4.56

As illustrated in table (2), polypharmacy was observed in women slightly more than men but mostly among seniors aged between 75-84 years. Unlike the nationality, which had no influence on polypharmacy (p-value > 0.05), the patient's marital status had a significant effect (p-value < 0.05); divorced/ widowed elderly patients who took ≥ 5 medicines were more than double of that of married subjects. Additionally, polypharmacy was significantly influenced by the patients' level of education (p-value < 0.05); over than 3/4 of subjects with higher education did not practice polypharmacy. Retirees and housewives/never worked participants were exposed to polypharmacy far more than the working participants. Self-medication had no effect on the use of polypharmacy (p-value 0.497). However, there was a significant association between polypharmacy and recent hospital/ emergency admission (p-value < 0.05); almost double the subjects who practiced polypharmacy had been recently admitted to a hospital.

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Faculty of Medicine, University of Benghazi
VOLMUE:2 ISSUE:1 June: 2025 BUMJ

Table.(2): Association between polypharmacy and some related factors.

Variables	Categories	No polypharmacy	Polypharmacy	P-value
Gender	Male	41 (69.5%)	18 (30.5%)	0.701
	Female	27 (65.9%)	14 (34.1%)	
Age	65-74 years	61 (71%)	25 (29%)	0.012
	75-84 years	3 (30%)	7 (70%)	
	≥ 85 years	4 (100%)	0	
Nationality	Libyan	61 (67.80%)	29 (32.20%)	0.886
	Non-Libyan	7 (70%)	3 (30%)	
Marital status	Married	54 (77.1%)	16 (22.9%)	0.006
	Divorced/widowed	13 (44.8%)	16 (55.2%)	
	Single	1 (100%)	0	
Education level	Low	17 (48.60%)	18 (51.40%)	0.008
	Medium	39 (76.5%)	12 (23.5%)	
	High	12 (85.70%)	2 (14.30%)	
Work status	Working	31 (81.60%)	7 (18.40%)	0.062
	Retired	18 (56.30%)	14 (43.80%)	
	Housewife/ never worked	19 (63.30%)	11(36.70%)	
Regular hospital check-ups	Yes	43 (68.25%)	20 (31.75%)	0.943
	No	25 (67.57%)	12 (32.43%)	
Self-medication	Yes	42 (65.60%)	22 (34.40%)	0.497
	No	26 (72.20%)	10 (27.80%)	
Recent hospital/ emergency admission	Yes	17 (53.10%)	15 (46.90%)	0.029
	No	51 (75%)	17 (25%)	

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Table (3) displays the study participant's distribution based on MMAS-8 scores. Subjects from both genders generally scored low on the MMAS-8 with only 15% and 7% of males and females, respectively, scoring high. Age had no influence on drug compliance (p-value > 0.05) but the nationality had a strong impact (p-value < 0.05). Additionally, the level of dug compliance varied with the patients' marital status as married subjects had generally better MMAS-8 scores compared to widowed/ divorced subjects. A lower level of education caused a significant drop in compliance (<6) whereas a medium score adherence (6 to < 8) was achieved by half of those with advanced education. The level of medication adherence was generally low for all subjects of different marital status, however, the poorest adherence was observed among housewives and subjects that never worked before. Most of the subjects who self-medicated had a low MMAS-8 score as well as those who were recently admitted to a hospital/emergency room.

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Table.(3): Distribution of the study population based on their characteristics and medication adherence scores.

Variables	Categories	MMAS-8 score			P-value
		Low (< 6)	Medium (6 to < 8)	High (8)	
Gender	Male	35 (59%)	15 (25%)	9 (15%)	0.144
	Female	32 (78%)	6 (15%)	3 (7%)	
Age	65-74 years	56 (65.11%)	21 (24.42%)	9 (10.46%)	0.285
	75-84 years	8 (80%)	0	2 (20%)	
	≥ 85 years	3 (75%)	0	1 (25%)	
Nationality	Libyan	62 (68.9%)	16 (17.8%)	12 (13.3%)	0.044
	Non-Libyan	5 (50%)	5 (50%)	0	
Marital status	Married	42 (60%)	19 (27.1%)	9 (12.9%)	0.185
	Divorced/ widowed	24 (82.8%)	2 (6.9%)	3 (10.3%)	
	Single	1 (100%)	0	0	
Education level	Low	31 (88.6%)	2 (5.7%)	2 (5.7%)	0.001
	Medium	32 (62.7%)	12 (23.5%)	7 (13.7%)	
	High	4 (28.57%)	7 (50%)	3 (21.43%)	
Work status	Working	20 (52.6%)	13 (34.2%)	5 (13.2%)	0.066
	Retired	22 (68.8%)	5 (15.6%)	5 (15.6%)	
	House-wife/never worked	25 (83.3%)	3 (10%)	2 (6.7%)	
Regular hospital check-ups	Yes	42 (66.66%)	14 (22.22%)	7 (11.11%)	0.889
	No	25 (67.57%)	7 (18.92%)	5 (13.51%)	

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Self-medication	Yes	46 (71.90%)	11 (17.2%)	7 (10.9%)	0.363
	No	21 (58.30%)	10 (27.80%)	5 (13.9%)	
Recent hospital/ emergency admission	Yes	27 (84.40%)	2 (6.3%)	3 (9.4%)	0.026
	No	40 (58.80%)	19 (27.90%)	9 (13.20%)	

Figure (1) shows the relation between medication adherence and polypharmacy. A significant drop in the MMAS-8 score of study participants was associated with an increase in the number of prescription medications taken on regular basis.

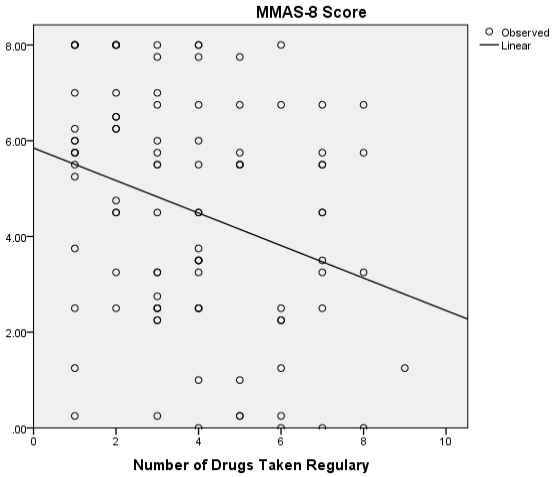

Figure. (1): The correlation between polypharmacy and drug compliance.

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Discussion:

The prevalence of polypharmacy in this study was 32%, which is comparable to the findings of previous research carried out in Iran (23.1%) [20] and Canada (27%) [3]. However, other studies conducted in India [1], China [4] and Egypt [16] reported much higher figures 49%, 50.14% and 85.3%, respectively.

Although our study did not reveal a possible link between polypharmacy and gender (p-value > 0.05), other studies showed a positive correlation. A research conducted by Hosseini et al. demonstrated that women in Iran who were reported taking five or more medications on a regular basis were far more than men [20]. In contrast, a study carried out by Maxwell et al. showed that the prevalence of polypharmacy generally declined among Canadian women, especially younger women with fewer chronic conditions, while it increased across all ages and multimorbidity levels among men [14].

Furthermore, the marital status of participants had a significant impact (p-value < 0.05) on polypharmacy in this study, as widowed/divorced patients used polypharmacy far more than married subjects and this could be justified by the fact that the psychological health of widowed/ divorced patients is likely to have worsened as a result of their social situation. On the other hand, being married was associated with higher polypharmacy levels in another study [20].

Our study has also shown that the lower the level of education, the greater the likelihood of polypharmacy (p-value < 0.05). These results were similar to the findings of a study carried out by

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Sarwar et al. in Pakistan [15] but contradictory to the findings of another study conducted by Eltaher and Araby in Egypt which related polypharmacy to other significant predictors such as sex, residence, monthly income and co-morbidity [16]. It could be explained that patients with a higher level of education often have better access to pharmacological information, hence, they are involved more in patient-physician communication and their awareness of polypharmacy is greater. This would subsequently lead to more frequent medication reviews by the physician and a more successful negotiation process of physician-patient drug treatment.

Although there was no association between polypharmacy and the subjects' work status in this study (p-value > 0.05), polypharmacy was least observed among the working participants compared to retirees and housewives and this finding was similar to the results of a study carried out by Kutsal and her colleagues. [17]. Rosa et al. addressed the possible effect of being a housewife or a retiree on polypharmacy and suggested that these patients are almost 8 times more likely to present with chronic diseases, hence, they are more prone to using five and more medications at the same time [21]. A previous study investigating polypharmacy among Canadian seniors revealed that the number of prescription medications was associated with higher rates of hospital/emergency department admission [3] and this was in line with our findings (p-value < 0.05). The concurrent use of multiple medications, hence, the increased risk of drug-drug interactions and adverse drug reactions, coupled with impaired drug compliance and poor quality of life, all together

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could explain the correlation between polypharmacy and the high rates of hospital/emergency room admission observed in this study.

The issue of medication non-adherence is a growing concern and the World Health Organization (WHO) considers it an additional burden to diseases [22]. In this study, adherence to prescribed medications was generally poor with the level of compliance being 67% low, 21% medium and 12% high. Although this study did not explore the reasons behind this poor adherence, it could be due to multifactorial reasons either intentional or non-intentional. Intentional non-compliance occurs when patients decide not to adhere correctly to their prescribed treatment regimen because they weigh the benefits and risks of the treatment against any adverse effects. On the other hand, unintentional non-adherence occurs due to the forgetfulness or carelessness of the patient about adhering to their prescribed medications [23]. Data from a previous study showed that 49.6% of patients mentioned forgetfulness as one of the major non-intentional reasons for non-compliance [24]. Additionally, elderly patients have specific problems that are age related for non-adherence such as psychosocial issues (e.g., cognitive incapacity) and physical inability (e.g., poor eyesight) [25]. An Indian study carried out by Punnapurath et al. assessed drug compliance among elderly patients with chronic illnesses in two visits and showed better results than our findings; the level of compliance in the first assessment was low in 2%, medium in 16% and high in 82% while in the second assessment it was low in 1%,

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medium in 25% and high in 74% of the subjects [26].

In line with our findings, an Italian study carried out by Pasina et al. revealed that medication compliance was particularly low among patients receiving a high number of medications but found no association between adherence and demographic variables such as age, sex and marital status [27]. Another study, however, conducted by Jin et al. in South Korea linked drug compliance of elderly patients with a number of factors such as the dosing frequency, education level and the presence of health-related problems, but no association was found with other factors such as age [25].

Conclusion:

Our study revealed that polypharmacy was frequently practiced by the elderly population of Benghazi, Libya. Age, marital status, level of education and recent hospital/ emergency admission were all important indicators for polypharmacy. Additionally, adherence to prescription medications was generally low and it was linked to a number of risk factors such as patient's nationality, education level and recent hospital/emergency admission.

Recommendations:

Polypharmacy and its negative consequences such as medication non-adherence, especially in the elderly, could be addressed through several strategies. During regular check-ups, for example, physicians should consider deprescribing; lowering the dose or stopping medications that are unnecessary or possibly harmful. Furthermore, pharmacists should have a more significant role in reducing unnecessary

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polypharmacy and optimizing patient care by assessing medication regimens, providing extensive education and working as a link between patients and physicians. Moreover, strengthening patient-physician communication and enhancing physician-physician communication and inter-professional collaboration could also help in minimizing polypharmacy.Finally, appropriate patient follow-ups should be scheduled to measure medication adherence by various methods (e.g., smart pill bottles) and to determine any possible obstacles related to it.

Limitationsl:

This study has a number of potential limitations. Firstly, it was conducted in a short period of time and the sample size was small, resulting in some characteristics such as the nationality and gender failing to produce clear results. Secondly, the reasons behind polypharmacy and medication non-adherence were not explored, hence, further studies are needed to address these health issues. Finally, since this study was not carried out in a hospital setting, the results obtained via the questionnaire could be subjective to the patients' perceptions.

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Metabolic Dysfunction Associated Steatotic Liver Disease (MASLD), An Underappreciated Threat.

Najat Omer Buzaid[1], Sami A. Lawgaly[2]

Letter to editor

Dear editor

A 56-year-old woman was presented to the outpatient clinic with a dull aching pain in the right upper abdominal quadrant. She was diagnosed with type 2 diabetes mellitus (T2DM) three years ago, and she is taking Metformin tablets as the sole medication. Her body mass index (BMI) was 32 kg/m^2. An abdominal ultrasound scan revealed a single gall bladder stone and fatty liver. The platelets count was 150x10^3/ml; aspartate aminotransferase (AST) and alanine aminotransferase (ALT) were 50 U/L and 40 U/L, respectively. Serological testing for viral hepatitis was negative. Other metabolic and autoimmune causes of liver disease were excluded.

What would be the most appropriate next step in management?

A.Reassurance and no further treatment is needed.

B.Liver elastography is indicated.

C.Liver biopsy is indicated urgently.

Metabolic dysfunction associated steatotic liver disease (MASLD)- previously known as non-alcoholic fatty liver disease (NAFLD)- is a common health problem with an increasing prevalence globally. Its more severe

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form, metabolic dysfunction associated hepatitis (MASH)- previously known as a non-alcoholic steatohepatitis (NASH)- is characterized by hepatic inflammation secondary to fat accumulation. MASLD was first reported in 1980s, and was described as a liver disease resembling alcoholic fatty liver among persons who were drinking little or no alcohol. The estimated global prevalence of MASLD is 38%. [1]

Importantly, MASLD and MASH are not merely hepatic conditions; they are strongly associated with metabolic syndrome and are recognized as a single risk factor for atherosclerotic cardiovascular disease. They are reported in many studies to be associated with chronic kidney disease. Nevertheless, about 5% of MASLD cases have hepatic steatosis without traditional cardiovascular risk factors. [2]

Several factors contribute to the development of MASH, including obesity, insulin resistance, obstructive sleep apnea, gut microbiota dysbiosis and genetic factors.

The initial pathological process is the accumulation of fat in the liver, where fat accumulation leads to mitochondrial dysfunction, oxidative stress and inflammation. Changes in gut microbiota increase free fatty acid release, which leads to activation of cytokines, interleukins and induces inflammation. [4]

MASH can progress to more serious complications such as; hepatic fibrosis, liver cirrhosis and hepato-cellular carcinoma. [3] It has been linked to a higher rate of uterine, renal and other gastrointestinal malignancies. [3,5]

The nomenclature shift from NAFLED/NASH to MASLD/MASH, was aimed to eliminate

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the stigma linked to the term 'alcoholic', emphasizing the underawareness of the cardio-metabolic risk of these conditions. (6)

MASLD is closely related to obesity, insulin resistance, pre-diabetes and T2DM. The presence of T2DM, abdominal obesity and age over 50 years, all increase the progression of MASLD to more serious complications. The estimated prevalence of MASLD in the Middle East and North Africa (MENA) region is 39.43% among people without T2DM and 68.71% among those with T2DM. (7) The growing prevalence of T2DM in the MENA region explains the high prevalence of MASLD in this region as both are a risk factor for each other. MASLD is also prevalent among children aged 18 years or less and it was estimated to reach 13%. (8) In a survey for cardio-metabolic risk factors in Libya, the percentage of those with overweight and obesity reached 56.8% and 28.9% respectively. (9) This might predict an expected high risk of MASLD and MASH among Libyan population, although local prevalence data are lacking.

MASLD is a diagnosis of exclusion. Other conditions such as viral hepatitis, drug- induced or autoimmune hepatitis, metabolic diseases including Wilson's disease and hemochromatosis must be ruled out.

In clinical practice, particularly in Libya, physicians tend to assure individuals with diabetes mellitus and MASLD. Some physicians may advise patients with fatty liver to lose weight and may test them for hepatitis viral serology and autoimmune hepatitis screening if they have raised liver enzymes. However; such an approach will overlook the seriousness of this condition.

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In order to prevent the progression of MASLD to more serious complications, it is of great importance to stage the disease and to manage it accordingly. Liver biopsy is the gold standard for staging and determining the severity of MASLD, however it is an invasive method and carries the risk of bleeding and infection. In order to minimize the risk of exposure to invasive methods, there are many non-invasive methods to determine fibrosis risk and in order to guide further investigations and management. Some of these tools are Fibrosis-4 (FIB-4), Steatosis-Associated Fibrosis Estimator (SAFE) and Enhanced Liver Fibrosis (ELF) scores.

One of the widely used tools is the FIB-4 score. The FIB-4 score elements include: age, BMI, AST, ALT and platelet count. It can be used easily at the out-patient's clinic. A calculated FIB-4 score of < 1.3 is considered as low risk for fibrosis, while a score of >2.67 indicates the need for direct referral to hepatologist, and a score between 1.3 and 2.67 indicates the need for the measurement of liver stiffness and referral to a specialist in liver disease. FIB-4 score is a good predictor of liver fibrosis but needs confirmation with further test. The FIB-4 score had a high negative predictive value for advanced hepatic fibrosis and it is recommended for patients with cardio-metabolic risk such as people with T2DM. [10, 11]

SAFE score is composed of age, BMI, diabetes status, platelet count, AST, ALT and globulin levels. While ELF measures hyaluronic acid, procollagen III amino-terminal peptide and tissue inhibitor of metalloproteinases-1 which are markers of fibrosis.

Liver stiffness is measured by Fibroscan, or vibration-con-

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trolled transient elastography. It is a non-invasive imaging that is used to assess liver stiffness, which determines the degree of fibrosis. The Fibroscan-AST (FAST) score is composed of liver stiffness measurements and AST level, and it is useful for individuals with MASH and who are likely to have more advanced fibrosis and may need more aggressive management.

There are several interventions to prevent the progression of MASLD to advanced liver disease, including lifestyle measures as well as pharmacological therapy. Assessment of cardio-metabolic risk factors, renal function and screening for extra-hepatic malignancies is also crucial. The Mediterranean diet and exercise for 150 minutes per week are recommended to improve liver injury. [12] Exercise is an independent factor for improving steatosis regardless of weight loss. [13] Bariatric surgery can improve the outcome of obese individuals.

Thyromimetic (Resmetirom), Ursodeoxycholic acid, Omega-3 polyunsaturated fatty acids, incretin mimetics and sodium glucose co- transporter-2 inhibitors (SGLT2i), all have beneficial effects in MASH. SGLT2i and incretin mimetics are recommended only for patients with T2DM, the latter is also recommended in obese individuals. Statins, metformin and glitazones have shown some beneficial effects on MASH.

Management of MASLD is a multidisciplinary team approach. An endocrinologist, a nutritionist and a hepatologist are the main members of the team. It is of great importance to appreciate the threat of MASLD and MASH. It is recommended to screen those at risk, like T2DM patients, and to raise the awareness

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of healthcare providers regarding case detection and the noninvasive staging of the disease. Implementation of a referral pathway is mandatory.

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