Assessment of knowledge, attitude, and practice of primary care physicians regarding the common dermatologic conditions in Sudan 2024: a cross-sectional study

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Introduction:

Background

Dermatological conditions represent a major health problem globally. Skin disorders were considered the 18th cause of global disability and ranked as the fourth cause of non-fatal disease burden worldwide in 2013. (1)

According to the global skin and subcutaneous diseases burden report in 2019, 4,859,267,654 new cases of skin disorders were reported. The majority of these disorders are attributed to fungal infections (34%) followed by bacterial skin infections accounting for 23% of the cases and the incidence of skin disorders is slightly higher in men. In addition to that, the number of deaths from skin conditions worldwide is 98.522, most of whom died of bacterial skin infections (72%).

In fact, there has been a substantial increase in the mortality rate due to skin diseases globally in comparison to 1990 by 71%. Geographically, the highest morbidity and mortality rates as a consequence of skin conditions were in the South Asia region (25%) Regarding age, Skin and subcutaneous diseases affect all age groups; however, children are found to be the most affected age category as a result of the smoothness and softness of their skin. (1) Particularly those under 4 years of age who represent the majority of new cases. Nevertheless, death is more prevalent in the older population who are aged above 80 years and both genders are affected equally. (2) In the region of western Sudan, the most common skin disorders are fungal skin infections account for 32.6% of cases which is similar to the report of global disease burden in 2019, followed by eczema at 10.5%, and bacterial skin infections labelled as the third common skin disorder at 10.3%. (3)

Although skin conditions are mostly benign and non-fatal, they significantly impact individuals' quality of life, leading to long-term disability. Mental, social and emotional well-being is negatively affected by skin disorders leading to social isolation. These adverse impacts extend beyond individuals, influencing their families, partners, and friends, especially for those patients with chronic and disfiguring skin conditions who are more likely to encounter psychological distress, depression along suicidal attempts. (1)

In Africa, skin disorders impact 21- 87% of children and account for up to one-third of all outpatient consultations with paediatricians and dermatologists. (4) Furthermore, studies have indicated that a notable proportion, ranging from 6% to 24%, of primary care visits are attributed to skin conditions, positioning dermatological ailments as a prominent motive for seeking medical advice within the realm of primary healthcare. (5)

Primary care physicians are the cornerstone of the health system since they play an essential role in the diagnosis of patients with common skin disorders. They represent a considerable

percentage of the overall patients who attend primary health care centres and take on the responsibility of managing common skin conditions, in addition to referring patients who need further consultation and assessment by dermatologists. Therefore, primary health care physicians must be well informed and surprisingly knowledgeable about common dermatological conditions and competent in the recognition and management of those conditions. This will subsequently lead to faster diagnosis, a desirable patient outcome, and greater patient satisfaction. In addition to a lower referral rate to dermatologists, this necessarily reduces the burden on the health system.

Since there are no available documents in Sudan and less attention is paid to skin conditions, we aim to assess the level of knowledge of recognition, diagnosis, and management of common skin conditions among primary health care physicians working in the primary care centres in Sudan, address the area of weakness and try to fill the gaps in practice regarding the management of common skin disorders.

Problem statement

The Global Burden of Diseases Study 2013 stated that Skin diseases were the 18th most common cause of global disability-adjusted life years and the fourth most common category of non-fatal disease.
skin diseases are one of the most common human illnesses (6), Many patients present to the emergency department with skin conditions that are not true dermatologic emergencies (7) Urgent skin conditions caused by allergic drug reactions, severe immune-mediated diseases or infections, are uncommon and the conditions are rare, they can be sometimes challenging to diagnose. and non-dermatologists are responsible for their care (8). Early recognition and timely intervention are crucial to ensure the best outcome and prevent any complications (9). While the majority of ambulatory patient visits are seen by PCPs, it is estimated that 6–7% of all these visits are for dermatologic complaints (9,10). Despite the relatively high incidence of skin disorders, training for healthcare professionals in dermatology is often limited (11,12). Due to ecological variables, sanitation standards, social mores, and genetics, the pattern of skin disorders differs from nation to nation, and even from region to region within the same country, some studies focused only on diagnosing skin cancer using cross-sectional questionnaire assessment, concluding that many non-dermatologists face challenges in recognizing and diagnosing different stages of skin cancer (13) another study discussed the accuracy of non-dermatologists' initial judgement on inpatient dermatologic conditions by comparing the non-dermatologist referring notes with the reviewing dermatologist response concluding that non-dermatologists misdiagnose many common and uncommon skin conditions respecting case rarity(14) , study from Yemen conclude that PCPs were not properly trained to diagnose and treat skin diseases. Dermatologic training and curricula at medical schools need a comprehensive evaluation (15). The different levels of experience between dermatologists and non-dermatologists may affect the quality of dermatologic care and may explain in part the greater expertise dermatologists have in diagnosing and treating skin disease. (16)

Justification

Primary care physicians (PCPs) represent the backbone of any health care system as they provide the basic health services demanded by the majority of patients. As a consequence, the exposure of primary care physicians (PCPs) to skin disorders has increased. However, information is lacking regarding the level of proficiency of PCPs in this field. Despite the fact that skin conditions have a lower fatality rate and consequently receive less attention than more serious medical conditions,4,5 their contribution to total morbidity occupies a significant cost on the community, imposing a burden on the health care resources and personnel. Few works of literature covered this topic throughout different decades because very little data were conducted and the study was never done in our region, we aim to conduct an online assessment using a questionnaire assessing the ability of non-dermatologists to recognize urgent skin diseases at Sudanese hospitals.

Literature review:

The structure and functions of the skin:

Skin is considered to be the largest body organ (17). which comprises 15% of total body weight (18). It is composed of three layers epidermis, dermis, and subcutaneous tissue (18). The epidermis contains many types of cells keratinocytes predominate and also contain Langerhans cells, melanocytes, and Merkel cells (19). There are four layers in the epidermis basal layer, stratum spinosum, stratum granulosum, and stratum corneum respectively (20). The dermis is the intervening lamina of the skin. The main cell type in the dermis is fibroblast which produces collagen elastin and other proteins. It also contains neurovascular structures and sweat glands. The dermis comprises two layers papillary and reticular dermis (21). The subcutaneous tissue or hypodermis is composed of adipocytes, fibroblasts, and macrophages. It also contains substances like proteoglycan and glycosaminoglycans. It is involved in thermoregulation during cold and exercise (22).

Functions of the skin:

- protection against microbes and chemicals through the layer of stratum corneum. It also protects against dehydration and acts as a shock-absorbent (18).
- sensory function through receptors that regulate the sensation there are two types of receptors located in the dermis bare nerve endings which are responsible for pain and temperature sensation and encapsulated mechanoreceptors which are responsible for touch and vibration.
- Homeostasis: it prevents heat and water loss.
- Vitamin D synthesis (19).
- cosmetic effect (18).

Diagnosis and classification of skin diseases:

Most common skin diseases like skin carcinoma and leprosy if not diagnosed early can lead to death. Here are some examples of common skin disorders and how they are diagnosed:

Malignant melanoma: is classified into squamous cell carcinoma and basal cell carcinoma which are mainly diagnosed by biopsy

Leprosy: which is caused by mycobacterium leprea which produces skin and neurologic defects. It can be diagnosed by skin smears and skin biopsy.

Viral skin diseases: like rubella, measles, herpes simplex virus, and human papillomavirus mainly are diagnosed clinically (23).

Psoriasis: it is a genetic disease that causes hyperproliferation and abnormal differentiation of keratinocytes. It can be diagnosed clinically (24).

Dermatophyte infections: like tinea capitis, tinea pedis, tinea ungium, and tinea cruris are common in developing countries. Can be diagnosed by clinical examination, microscopy, culture, and polymerase chain reaction (25).

Scabies: is a parasitic infection that affects only humans. It exists in many forms and causes severe pruritus. It is mainly diagnosed clinically also by microscopy and dermoscopy (26).

Common dermatologic conditions worldwide:

The most common dermatologic conditions occurring worldwide are as follows: dermatitis, acne vulgaris, urticaria, psoriasis, viral skin diseases, fungal skin diseases, scabies, melanoma, pyoderma,cellulitis, keratinocyte malignancy, decubitus ulcer, alopecia areata, itchiness, with the remaining dermatoses falling under the heterogenous 'Other skin and subcutaneous diseases' category (27).

Common dermatologic conditions in Africa:

The most common dermatologic conditions in Africa are as follow: Atopic Dermatitis (7.49%), Tinea Versicolor (4.94%), Acne Vulgaris (3.73%), Papular Urticaria (3.47%), Tinea (2.94%), irritant Contact Dermatitis (2.94%), Scabies (2.76%), Seborrheic Dermatitis (2.50%), Pityriasis Rosea (2.26%), Urticaria (2.18%), Viral Warts (1.85%), dermatophytes of the scalp (1.80%), Lichen Planus (1.77%), Vitiligo (1.77%) and Lichen Simplex Chronicus (1.45%) (27).

Common dermatologic conditions in Sudan:

The information about the prevalence and incidence of common skin diseases in the Sudanese population is insufficient and lacks data about the burden of dermatologic conditions on the Sudanese population. A study conducted in Nyala in western Sudan about the most common dermatologic conditions in this area showed that the prevalence of skin conditions in children under 18 years was 96% compared to 88.3% in adults with a total prevalence of 92.6%. The top 13 dermatologic disorders in Nyala were as follows: fungal infections (32.6%), dermatitis/eczema (10.5%), bacterial skin infections (10.3%), disorders of skin appendages (8.7%), parasitic infections (7.7%), atrophic skin disorders (7.4%), pigmentation disorders (7.4%), hypertrophic skin disorders (6.4%), viral infections (5.8), benign neoplasm (1.9%), dermatoses due to animal injury (0.4%), bullous dermatoses (0.1%), and malignant neoplasm (0.1%) (28).

Another study published in 2023 investigating fungal infections among Sudanese populations proposed that tinea capitis affects 3.22% of school children in Sudan with 17% occurring in the eastern part of the country (29). Kafi et al showed that the prevalence of vulvovaginal candidiasis is 10.1% (30) while in pregnant women who are at higher risk, the recorded prevalence was 16.6% and 32.6% according to Nemery et al. and Abdelaziz et al. (31), correspondingly.

Sudan is considered highly endemic with mycetoma that causes a huge impact on patient's health, the community, and the entire health system (32). Abbott's study in 1952 estimated the prevalence of mycetoma to be 4.6 per 100,000 inhabitants based on a cohort of 1,231 mycetoma patients admitted to hospitals throughout the country (33). lately in 2014, a huge meta-analysis conducted by van de Sande *et al*. estimated that the mycetoma prevalence in Sudan was 1.81 cases per 100,000 inhabitants (34).

Primary Healthcare and Primary Healthcare Doctors:

Primary healthcare is a wide range of health services provided for the community. It is main pillar is to support the health needs of the society throughout their life in an inclusive, equal, easily accessible and cost-effective way. It encompasses health promotion and disease prevention, community empowering and education, rehabilitation and interdisciplinary teamwork. The workforce is composed of general healthcare practitioners, nurses and pharmacists and other supporting providers. Primary healthcare doctors vary in their duties, names and level of education across different health systems, but one unified fact is that most of the time they are the first responders in the health system hence their role in the system is crucial (35,36).

Patients frequently present to primary healthcare for skin and skin appendages related problems (37), and primary care doctors play a vital role in diagnosing, managing and referring these conditions. Therefore, regular training is required to meet this need (38). However, a significant proportion of patients apply directly to secondary and tertiary care for their skin problems therefore there is a need to promote dermatologic consultation in primary care to reduce the pressure of the higher levels of care (39). This can be achieved by providing regular training and courses which proved to have a significant impact on the knowledge level of practising doctors which in turn is directly reflected on patient care (40).

Primary Healthcare in Sudan:

No sufficient data is available regarding the current healthcare in Sudan. Sudan first adopted primary healthcare in 1972. The working sites include primary healthcare centres and rural hospitals as well as other smaller health units which in turn refer to them, and there are plenty of non-profit and private organisations providing different levels of healthcare. All of which are managed by the State and Federal Ministries of Health. The workforce is distributed -yet differently- among these sites and comprises community health workers, nurses, medical assistants and doctors. (41)

Similar studies:

A study was done in the Jouf region in Saudi Arabia to assess primary care physician's expertise of common dermatological conditions with respect to their recognition, management and referral as well as the factors influencing their practice in an attempt to identify the weaknesses in handling these conditions. The study used a cross-sectional survey and interviews targeting all primary care physicians working in the Jouf region (n=103) over four months. Standardised photos from DermNetNZ.org and American Academy of Family Physicians standards were used. 61 participants completed the survey of which 27 were general practitioners and 34 were family medicine specialists. Mean years in practice was 12 (±7) and mean number of consultations per month were 27(±25). On a scale of 10; 7.08(±1.3) was the mean overall knowledge level and the

highest scores were significant for those with five years or more experience. The highest overall knowledge score (87.3%) was for skin appendages disorders. The mean diagnostic score was 7.01(±1.51) and the mean management score was 7.14(±1.3). There was a weak negative correlation between higher knowledge, correct diagnosis and correct management with referral decisions. The study concluded that most primary care physicians showed sufficient knowledge and more clinical years and exposure lead to better knowledge and fewer referral cases with a potential for further optimization. (42)

Another study in Jeddah, Saudi Arabia was conducted at the tertiary care centre King Abdulaziz University Hospital to assess non-dermatologists ability to recognize urgent skin disease , the 161 participants included consultants, specialists and residents from different specialties actively working in the hospital the Google Form questionnaire was distributed via email and by two dermatology consultants, it was composed of a socio-demographic section and assessment section the latter contains case scenarios and pictures of urgent dermatological conditions and participants were asked to rate their confidence level while answering each question on a scale from one to ten. The most recognized urgent skin condition was herpes zoster which was recognized by 88.8% of the participants with 49.1% confidence score followed by cellulitis 80.1% and Pemphigus vulgaris what the least recognized, only by 28% out of which 12.4% were confident some diseases were recognized correctly at high percentage despite the physicians being not confident about diagnosing them reflecting a varied relation between the correct answers and level of confidence. The accuracy percentage was 61.33% however it decreased to 25.3% when it was recalculated with respect to full confidence level educational level and gender didn't significantly affect the ability to answer correctly. In general, the study demonstrated that physicians face some difficulties in recognizing urgent skin diseases and highlights the need for more dermatological courses and training. (43)

In the Philippines another cross-sectional study was conducted to determine the knowledge, attitudes, perception and practice of Primary Care Physicians regarding common dermatologic conditions in rural areas (Doctors to the Barrios DTTBs) with respect to their diagnosis and management and to assess the level of service delivery network and referral protocols. Of the 118 DTTBs who were included 65.77% had less than one year of experience as DTTBs. The results showed no association between age, educational level and clinical experience regarding the knowledge of common skin diseases. Despite 6% of the consultations being for skin diseases per week; only 25% of the doctors can access dermatological consultation leaving them with the burden to diagnose and manage the majority of presenting cases. The study also demonstrates that the most commonly diagnosed disease was dermatitis followed by superficial infections. 55% of the physicians have insufficient knowledge with scores less than 60% while most doctors rated their competency in recognition and treatment of skin diseases as average to bad and about half of them refer patients when they are unsure about the diagnosis. Also, the majority of the physicians showed an interest in learning more about skin diseases and acknowledged the importance of acquiring adequate knowledge. (44)

A cross-sectional study was conducted to assess the knowledge, attitude and practice of primary health care doctors about common dermatology conditions in Abha City, Saudi Arabia in 2017 using a validated self-administered questionnaire. It included GPs and family physicians working

in primary healthcare centres. The study showed that more than two thirds (69.5%) of the participants had insufficient knowledge whereas 21.9% and 4.8% had good and excellent knowledge respectively. Physicians who had higher than bachelor degrees, more than three months experience and physicians who attended training courses in dermatology (30%) had significantly higher levels of knowledge. The majority of doctors agreed that they should have a role in the management of common dermatologic conditions. (45)

A study was done to assess Primary care physicians' knowledge and self-perception of competency in dermatology in Yemen conducted by Salma et al, Mona et al and Raed et al (46). It was a cross-sectional study; a simple random sample was obtained and data was collected through a self-administered questionnaire which contained three sections: sociodemographic data, attitude and perception, and knowledge section. Data were analyzed using SPSS v19 (IBM: Armonk, New York). The response rate was 80% most of them were females at a rate of 85%. Regarding self-perception of competency in dermatology: (37.5%) perceived their ability to diagnose skin diseases as very good/good and (40.0%) PCPs perceived their ability to treat skin diseases as very good/good. The average score of PCPs' ability to classify skin lesions was 7.48 (±1.2) (out of 10). It also found that two-thirds of PCPs thought that patients receive better care in private clinics than public clinics so the rate of referral to dermatologists was higher among them. They concluded that there was no relationship between the ability to classify skin lesions and PCP's perception of self-competency in dermatology. They found that PCPs were not well trained to deal with common dermatologic diseases so they recommended that the dermatology curriculum in medical schools should be revised and strengthened to make PCPs more competent.

Another study was done to assess the ability of primary care physicians to recognize common dermatoses was conducted by Ramsy et al and Alissa et al (47). It involved 285 PCPs divided into four groups each group received different medical training. The first two groups received pre and post-test examinations while the other two received pretest examinations to assess their ability. The exam was in the form of 20 coloured slides about the most common skin diseases and candidates were asked about the diagnosis. The overall performance in the pretest exam was a mean score of 54% and only 16% of PCPs recognized lichen planus and 49% recognized acne. They recommended that wider studies should be done to address the causes of PCPs being unable to recognize common dermatologic conditions. They also recommended that there should be dermatology specialists available in primary care setting for better handling of dermatologic patients. They strengthened the point that PCPs should receive better medical training to enhance their ability to deal with patients.

Another study was done to investigate the diagnosis of skin disease in primary care by Mary et al, Maximilian et al, Erika et al, and Stefan et al (48). It was a qualitative study. Data was collected through semi-structured interviews. Data was analysed by MAXQDA-10. A total of 45 GPs were approached; only 14 of them agreed to participate in the study and most of them were females. Most of the participants were found to be able to give spot diagnoses, especially for morphologically distinct conditions but some of them depend on both history and examination to diagnose the condition of the patient. Most of the GPs tend to exclude the life-threatening condition and then address the presenting complaint. They concluded that GPs encounter a wide

range of skin conditions and they use different techniques to reach diagnosis. They recommended that more research should be done on the diagnosis of skin conditions in primary care to develop simple tools for GPs to diagnose skin conditions. They also recommended that GPs should receive regular training regarding the diagnosis and management of skin diseases.

Objectives

General Objective:

To assess the knowledge, attitude and practice of primary health care doctors regarding the diagnosis and management of common dermatological conditions in Sudan.

Specific objectives:

1. To identify the level of knowledge of primary health care doctors regarding the diagnosis and management of common dermatological conditions in Sudan.

2. To explore the attitude of primary health care doctors regarding the diagnosis and management of common dermatological conditions in Sudan.

3. To investigate the practices of primary health care doctors regarding the diagnosis and management of common dermatological conditions in Sudan.

Methodology:

Objective:

To evaluate the knowledge, attitude and practices of primary health care physicians regarding the diagnosis and management of common skin diseases in Sudan.

Study Design:

The research employed an observational cross-sectional study design.

Study Area:

The study will be conducted in the Republic of Sudan, which is located in northeastern Africa It is bordered by North is Bordered by Egypt , Northeast Has a coastline along the Red Sea ,East Shares borders with Eritrea and Ethiopia ,South Bordered by South Sudan 'Southwest Borders the Central African Republic 'West Shares a border with Chad 'Northwest Bordered by Libya ,It has 18 states Blue Nile, Central Darfur, East Darfur, Gedaref, Gezira, Kassala, Khartoum (the capital), North Darfur, North Kordofan, Northern, Red Sea, River Nile, Sinnar ,South Darfur, South Kordofan, West Darfur, West Kordofan, White Nile This number is after the secession of South Sudan, which occurred on July 9, 2011.

Sudan is the third largest country in Africa, covering an area of approximately 1,886,068 square kilometers (728,215 square miles), The population in July 2015 was an estimated 36.1 million people, according to recent estimates, the population of Sudan will reach approximately 49 million people in 2024. Sudan is considered the 31st most populous country in the world. (1)

Study Population:

The study population consists of Sudanese general practitioners (GPs) working in primary health care centers across different states in Sudan.

Inclusion Criteria:

Participants must meet the following criteria:

1. Sudanese nationality
2. Age above 23 years
3. General practitioner
4. Currently working in primary care centers
5. Residing in Sudan during the study period

Exclusion Criteria:

Individuals who do not meet the following criteria will be excluded:

1. Non-Sudanese

2. Age below 23 years
3. Non-general practitioners
4. Not working in primary care centers
5. Not residing in Sudan during the study period

Sample Size Calculation:

The sample size will be calculated using the following formula

Sample Size = **[z2 * p(1-p)] / e2**

z = z-score corresponding to the desired confidence interval, at 95% Confidence Level Z = 1.96.

e = desired margin of error, which is a 5% confidence limit.

p = estimated proportion of population with the characteristic of interest p = 0.5 is used for maximum variability

the sample size was calculated as 211

Data collection:

Sampling: The study will utilize multistage sampling technique to select the participants. whereby, In the first stage, the 18 states will be clustered into 5 main areas. Then, the participants will be sampled conveniently from within these areas due to accessibility challenges.

Ethical consideration: consent will be obtained from each participant, and personal identifying data are excluded from the questionnaire to ensure privacy.

Data collection tool: self-administered questionnaire designed through Google Forms to collect facts from the selected participants. The questionnaire captured applicable factors related to dermatology, knowledge, attitudes, and practices.

Several 211 questionnaires were collected, divided equally into five regions in Sudan: East, North, South, West, and Central

Data Analysis:

- **Data Description:**

Mean, median, frequency, and standard deviation will be used to express for the descriptive analysis to display the knowledge and attitude scores.

- **Software:**

Retrieved data will be analyzed using the statistical software package SPSS version 21

- **Statistical tests:**

We will use Chi-square test and Spearman correlation tests to examine for the association and correlation, and T- test, Kruskal-Wallis and Mann-Whitney U tests to explore the differences between variables depending on the normality of data. 0.05 is chosen as the cut-off point of significance for the p-value.

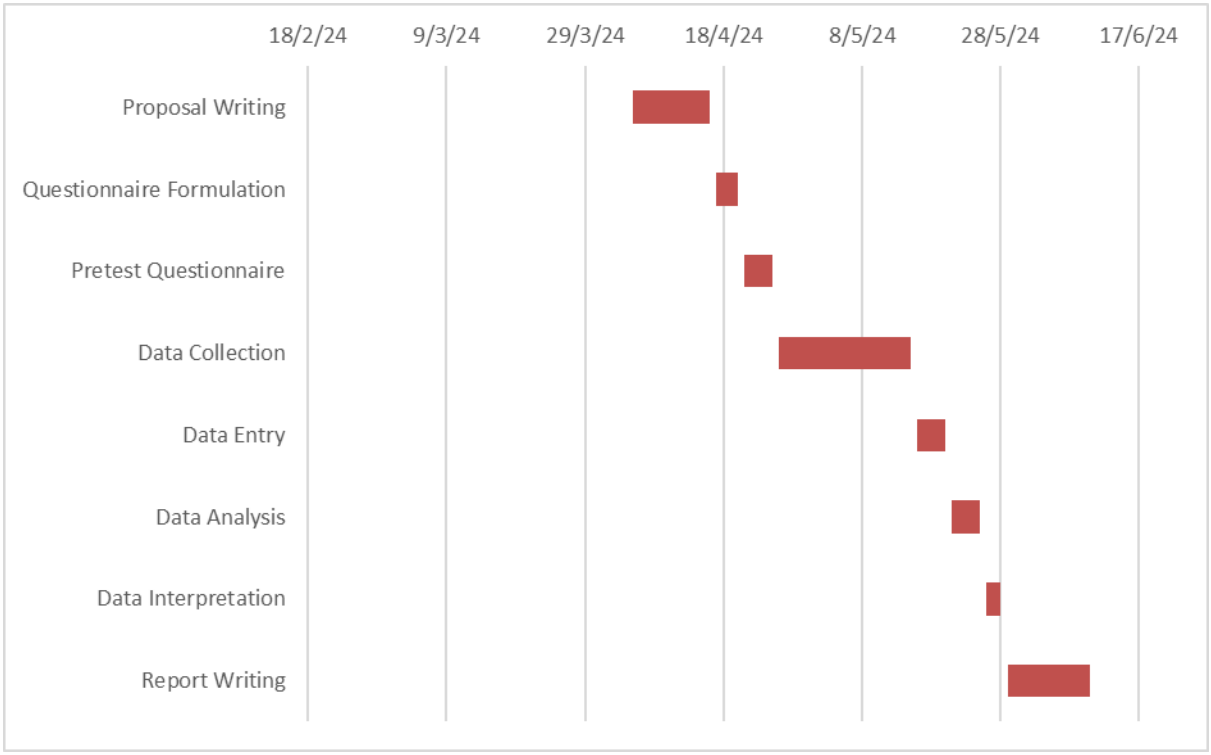
- **Handling Missing Data:**

Missing data will be handled using available case analysis (pairwise deletion).

- **Presentation of Results**

The data will be presented using graphs and tables to present the key findings.

Time frame: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17/6/24
Proposal Writing
Questionnaire Formulation
Pretest Questionnaire
Data Collection
Data Entry
Data Analysis
Data Interpretation
Report Writing

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