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ANTHROPOMETRIC PHYSICAL CHARACTERISTICS IN THE OCCUPATIONS OF AL-FOGGARAOF ADRARPROVINCE, ALGERIA: AN ANTHROPO-PHYSIOLOGICAL APPROACH

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Abstract. This study aims to analyze the anthropometric characteristics of a sample of al-Foggaraworkers in the Adrar region, considering it a traditional and physically demanding occupation practiced in harsh Saharan environments. A descriptive-analytical methodology was adopted, using field-based anthropometric measurements including height, weight, arm circumference, chest girth, and fat percentage, in addition to statistical tools such as mean, T-test, ANOVA, and Pearson correlation coefficient. The results revealed a mesomorphic-lean physical profile among the participants, strongly related to years of experience. The desert environment was also shown to influence specific physiological adaptations. These findings highlight the importance of recognizing this group within high-effort labor categories. The study recommends integrating anthropometric assessments into occupational health strategies and expanding anthropometric research to include traditional local occupations. In the core of the Algerian desert, particularly in the wilaya of Adrar Province, Algeria, the interaction between humans and the land is manifested in a distinctive work pattern associated with an underground water resource referred to locally as "al-Foggara." This practice, undertaken by local community members, is contingent upon specific environmental and professional conditions, necessitating repeated physical exertion and resilience to severe climatic and spatial circumstances.

Keywords: Anthropometric measurements, physical anthropology, hard labor, environmental adaptation, traditional occupations

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АНТРОПОМЕТРИЧЕСКИЕ ФИЗИЧЕСКИЕ ХАРАКТЕРИСТИКИ В ПРОФЕССИЯХ АЛЬ-ФОГГАРА В ПРОВИНЦИИ АДРАР, АЛЖИР: АНТРОПО-ФИЗИОЛОГИЧЕСКИЙ ПОДХОД

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Абстракт. Цель данного исследования- анализ антропометрических характеристик выборки рабочих аль-Фоггара в регионе Адрар, учитывая, что это традиционная и физически тяжелая профессия, выполняемая в суровых условиях Сахары. Использовалась описательно-аналитическая методология с полевыми антропометрическими измерениями, включая рост, вес, окружность руки, обхват груди и процент жира, а также статистические методы – среднее значение, Т-тест, ANOVA и коэффициент корреляции Пирсона. Результаты показали мезоморфно-тощий физический профиль участников, тесно связанный с опытом работы. Также установлено влияние пустынной среды на специфические физиологические адаптации. Эти выводы подчеркивают важность признания этой группы в категории тяжелого физического труда. Рекомендуется включение антропометрических оценок в стратегии охраны труда и расширение антропометрических исследований на традиционные местные профессии. В сердце алжирской пустыни, особенно в вилайете Адрар, взаимодействие человека и земли проявляется в уникальном рабочем режиме, связанном с подземным водным ресурсом, называемым местными жителями «аль-Фоггара». Эта практика, осуществляемая местным населением, зависит от специфических экологических и профессиональных условий, требующих повторяющихся физических усилий и выносливости к суровым климатическим и пространственным условиям.

Ключевые слова: антропометрические измерения, физическая антропология, тяжелый труд, адаптация к окружающей среде, традиционные профессии

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ƏLCƏZAİRİN ƏL-FOQQARAF ƏDRAR ƏYALƏTİNİN ƏRAZİLƏRİNDƏ FİZİKİ XÜSUSİYYƏTLƏR: ANTROPO-FİZİOLOJİ YANASMA

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Abstrakt. Bu tədqiqat, Adrar bölgəsində fəaliyyət göstərən əl-Foqqaraf işçilərinin antropometrik xüsusiyyətlərini təhlil edir. Bu peşəyə ənənəvi və fiziki olaraq tələb var və sərt Səhra mühitində həyata keçirilir. Tədqiqatda təsviri-analitik metodologiya tətbiq olunmuş, sahə şəraitində boy, çəki, qol ətrafı, sinə çevrəsi və piy faizi kimi antropometrik ölçmələr aparılmışdır. Statistik metodlar kimi orta dəyər, T-test, ANOVA və Pearson korrelyasiya əmsalı istifadə edilmişdir. Nəticələr iştirakçılar arasında mezomorf fiziki profili aşkar etmiş və bu profil təcrübə illəri ilə sıx əlaqəli olmuşdur. Səhra mühitinin spesifik fizioloji adaptasiyalara təsir etdiyi də müəyyən edilmişdir. Bu tapıntılar yüksək fiziki güc tələb edən işçi qrupları içərisində bu qrupun önəmini vurğulayır. Tədqiqat antropometrik qiymətləndirmələrin peşə sağlamlığı strategiyalarına daxil edilməsini və ənənəvi yerli peşələri də əhatə edən antropometrik araşdırmaların genişləndirilməsini tövsiyə edir. Bu proses Əlcəzairin səhra mühitində, xüsusilə Adrar vilayətində insan və torpaq arasında qarşılıqlı əlaqə, yerli "əl-Foggara" adlanan yeraltı su mənbəyi ilə bağlı fərqli iş modelində özünü göstərir. Bu fəaliyyət, yerli icma üzvləri tərəfindən həyata keçirilir və xüsusi ekoloji və peşə şərtlərinə bağlıdır; bu isə təkrar fiziki zəhmət və sərt iqlim şəraitinə dözüm tələb edir.

Açar sözlər: Antropometrik ölçmələr, fiziki antropologiya, ağır əmək, ətraf mühit adaptasiyası, ənənəvi peşələr

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1.Introduction

Consequently, the inquiry arises regarding the physical attributes of individuals engaged in this type of labor, as the physical viability of this activity is intrinsically connected to the composition of These inquiries facilitate a meticulous scientific investigation employing anthropometric instruments to examine the physical composition of al-Foggarapractitioners in Adrar Province, Algeria, through the lens of natural and physiological anthropology. This approach enables an understanding of biological and social adaptation to environmental and occupational circumstances, thereby underscoring the significance of research on a previously neglected subject. Despite its importance to science and society, this study provides a reference database on local physical traits, helping to create health and prevention strategies for a vulnerable group of workers, while also documenting the human and environmental aspects of a lifestyle deeply rooted in the desert.

1.1.The problem of the study

The work in the al-Foggara system is associated with a set of repetitive physical practices of a strenuous and time-prolonged nature, which imposes on those who carry it out specific physical characteristics, however, this category has not been studied in terms of physical measurements or physiological composition, especially in the desert context where environmental challenges are multiplied, the central problem posed by this study is an attempt to understand: What are the anthropometric characteristics prevalent among al-Foggaraworkers in Adrar Province, Algeria?, is there a functional relationship between these characteristics and the requirements of the professional activity they perform?, and what are the health and physical repercussions of this type of work on the structure of their bodies over time?, This problem highlights the need to integrate a biosocial approach in studying a topic that has been overlooked in many research studies, despite its scientific and cognitive richness.

1.2.Research problems

- This study is guided by the following questions derived from the aforementioned problem:
- What are the key physical measurements of a sample of al-Foggaraworkers in the wilaya of Adrar Province, Algeria?
- Is there a correlation between the characteristics of work in the al-foggara and the associated physical measurements?

1.3.Hypotheses

- The workers of Al-Foggaraare characterized by a specific physical structure that is commensurate with the nature of the strenuous activity they practice.

- The desert environment, through heat, drought, and physical repetition, produces a characteristic physiological pattern of Al-Foggara workers.
- There is a significant correlation between the years of activity and the intensity of physical endurance.

1.4.Importance of the study

This study is significant as it presents the inaugural comprehensive field analysis of the physical attributes linked to the profession of al-Foggarain Adrar Province, Algeria. It addresses a substantial knowledge gap concerning the interplay between the human body, the environment, and the profession within a specific cultural framework. The study holds practical relevance by enabling health institutions to identify early risk indicators associated with arduous labor in extreme climatic conditions, thereby facilitating the development of preventive and guidance programs for this professional group. Additionally, it possesses an academic dimension that enriches the field of physical anthropology within local communities, elucidating how objects respond to repetitive activities over time, which paves the way for future regional and professional comparisons, particularly given Algeria's lack of a national database in this domain.

1.5.Objectives of the study

This research seeks to accomplish many scientific and practical goals, including:

- Evaluation and examination of physical attributes (e.g., stature, mass, humeral circumference, adipose percentage, body mass index) among al-Foggaralaborers in Adrar Province, Algeria
- Correlating these metrics with the characteristics of the kinetic and environmental tasks they consistently perform
- Analysis of statistical variances among distinct age cohorts or years of experience
- Offer preventive recommendations in health and occupational domains grounded in precise field data
- Develop an employable knowledge repository for future comparative studies at national or regional scales
- Elevate the awareness of the local community and relevant institutions regarding the significance of safeguarding this demographic and providing health and professional support.

1.6.Study concepts

This element includes a precise clarification of the basic concepts that underpin the theoretical framework of the study to control the terminology used and remove possible semantic confusion, and this procedure also allows building a common knowledge ground between the researcher and the reader.

A.AnthropometricMeasurements

Physical measurements represent the cornerstone of studies related to the physical structure of humans, as they reflect the physiological and biological characteristics of the individual in a specific context, and include a set of indicators such as height, weight, body circumference, and fat ratios, and these measurements are used to estimate health status and fitness, and are also an indicator of the ability to adapt to environmental and occupational variables, especially in cases where physical effort is a continuous factor, anthropometric studies are not limited to description, but contribute to the development of standard classifications that help in Design of health or occupational preventive programs [Malina et al, 2004, p.388].

If these measurements have historically evolved from physical anthropology research, today they fall within a broader framework called human kinesiology, which is employed in the analysis of occupations and high-intensity physical activities, as the variation of these indicators between individuals or groups may be attributed to genetic factors, lifestyle, or work environment, and their analysis in a specific temporal and professional context, such as the vertebrate profession, allows a deeper understanding of how the body reacts to physical repetition, heat, and dehydration, especially in environments. In the desert, stamina becomes synonymous with physical resilience [Shephard, 2001, p.76].

B.al-Foggara as a conventional irrigation system (Foggara System)

al-Foggara is not just a traditional technique for fetching water, but is considered an integrated eco-social system that reflects the long-term interaction between man and the environment in the Algerian desert, it is based on the principle of gravity in transporting water from the aquifers without the need for pumps or external energy, and its drilling and maintenance requires a hard physical effort that may last for long hours underground, a task that is usually assigned to people experienced in this field, which gives this system cultural, economic and human specificity [Bisson, 2003, p.112].

Studies that have focused on the al-foggara system in Adrar Province, Algeria show that this style of work is practiced in difficult conditions ranging from excessive heat to work at depths of up to several meters below the surface of the earth, which requires a high level of physical efficiency and physical endurance, and the body becomes in this context a tool of work and steadfastness at the same time, so understanding the physical structure of workers in the vertebra is not only a descriptive matter but an analysis of how the body reshapes itself under pressure. Continuous of the environment and the profession [Rossi, 1995, p.147].

01.Photos of Al-Foggara workers in the workplace

C.PhysicalAnthropology

Physical anthropology examines human biodiversity through physical characteristics and the influences shaping this diversity, including environmental, genetic, and evolutionary factors. It emphasizes physiological adaptations of the human body in response to environmental variables, utilizing physical measurements as a fundamental tool, particularly for specific professional or societal groups. This methodology elucidates the relationship

between physical structure and the types of human activities undertaken [Brunet, 2005, p.94].

This method looks at the differences between human groups using a scientific approach that combines biology and social factors, making it a strong tool for understanding how human bodies interact with desert environments in jobs related to al-foggara. It views the body as something that is always changing and adjusting to work and the environment, combining physical anthropology with the study of how professionals interact with their surroundings, as seen in [Drinkwater 1988, p.214].

02.Photos of the Al-Foggara system above the ground

D.OccupationalMuscularActivity

The essence of this concept is the extent of energy consumption, the intensity of the effort expended, and the repetition of movements in the long term, so that some organs or muscle areas become more vulnerable to stress or excessive adaptation, and in the case of poor workers, this work takes a different dimension by virtue of the harsh environment and the nature of the underground movement, which imposes intensive operation of the posterior and upper muscles and hip, knee, and arm areas [Wilmore &Costill, 2005, p.211].

Studies often show that arduous occupations such as agriculture, exploration, or al-foggara produce over time more sophisticated body patterns in aspects of muscular endurance and bone density, and the body in this case becomes a "functional tool" adapted to the demands of the profession, and this is what makes this concept a focus for analyzing the relationship between physical structure and activity. According to Drinkwater [1988, p.216].

G.Environmental Physiological Adaptation

Environmental physiological adaptation refers to the ability of the human body to modify its organic and structural functions in response to the factors of the surrounding environment, whether it is related to temperature, humidity, atmospheric pressure, or excessive physical activity, and this adaptation represents a series of physiological transformations that help humans withstand in harsh environments, as the effects of this adaptation appear at the level of sweating rate, heartbeat, lung volume, and even in blood indicators and muscle density, and in cases such as Adrar Province, Algeria, the summer heat and underground work A factor that dictates a subtle pattern of organic adaptation to ensure continuous performance [Pandolf et al, 1988, p.174].

Human ecology studies have shown that people working in dry and desert areas have unique signs of adaptation compared to those living in cities or humid places, where their bodies act as a biological defense against the environment instead of just a way to move, which is especially evident in jobs like al-Foggarathat require enduring high heat and limited airflow.

H.Anthropometric Markers of Endurance

In the contexts of strenuous occupations, some physical indicators acquire special significance as signs of muscular endurance and functional fitness, such as leg circumference, fat percentage, body mass index, arm length, and rib cage circumference. These criteria are not only used in classifying bodies but also in assessing their ability to resist fatigue and carry out continuous physical activity, and studies indicate a strong association between some of these measurements and the extent of adaptation to long-term motor work, especially in cases of high heat [Eston & Reilly, 2001, p.53].

Thus, these indicators can be considered a diagnostic tool no less important than functional tests, especially if they are collected and analyzed within an accurate field database, such as those proposed by this study on poor workers, allowing us to understand the relationship between physical measurements and the ability to perform repetitive tasks, and these indicators may contribute to predicting potential health risks or directing workers towards the most appropriate tasks according to their physical structure, which is an essential step in engineering the functional distribution within field activities [Carter & Heath, 1990, p.121].

E.Occupational Health in Arid Zones

Working in desert areas presents significant challenges for workers, especially in informal jobs like those in al-Foggara, where high temperatures, low humidity, and poor airflow can lead to health issues such as heat stress, dehydration, muscle problems, and breathing difficulties. Medical studies indicate that these issues can lead to low energy, loss of essential minerals, and

weakened muscles, highlighting the need for preventive measures that consider both the job and the worker's health [Hanna & Tait, 2015, p.88].

However, institutions often overlook this issue, particularly in desert areas, where many work-related injuries or illnesses remain undocumented. Therefore, connecting physical measurements to overall health is a crucial step in understanding the work environment and developing more effective intervention plans. This connection can also help health authorities create guidelines for working in challenging conditions in hot and dry environments [Lucas et al., 2007, p.135].

1.6.Previous studies

This component seeks to highlight previous research efforts related to the topic of physical measurements and hard physical work, with a focus on environmental and occupational contexts close to the vertebrate profession, and also aims to uncover knowledge gaps that have not been addressed by these studies, allowing to identify the additional value that the current study seeks to provide in this area.

- **Study of Katsmarzik and Leonard (1998)**

This component aims to highlight previous research efforts related to the topic of physical measurements and demanding physical work, with a focus on environmental and occupational contexts relevant to the al-Foggara profession. Also, it aims to uncover knowledge gaps that have not been addressed by these studies, allowing us to identify the additional value that the current study seeks to provide in this area.

- **Study of Katsmarzik and Leonard (1998)**

This study investigated the relationship between obesity and physical composition among individuals working in remote and physically demanding environments. It focused on the impact of continuous physical activity on physical changes, such as a low fat percentage and increased muscle mass, especially in societies that rely on daily manual labour. The results showed that individuals who practice strenuous physical occupations have a physical structure closer to that of thin muscle patterns, with balanced indicators of bone mass [Katzmarzyk & Leonard, 1998, p.531].

However, the study focused on rural communities in Canada and South America, overlooking desert environments and failing to incorporate the cultural and social dimensions associated with the profession. In contrast, the current study aims to connect physical analysis with the environmental and social context of al-Foggara's function in Adrar.

- **Malena et al (2004)**

This study examined the changes that occur in the human body during the stages of growth and physical maturity in individuals who engage in

continuous sports or physical activities. It was found that physical measurements, such as height, weight, and muscle ratio, are significantly influenced by the type and duration of activity. The study concluded that strenuous occupations may accelerate specific manifestations of muscle maturity and alter the physical structure to meet the demands of the profession [Malina et al., 2004, p.371].

However, the study focused solely on the institutional mathematical framework and did not analyse traditional professions or non-professionally organized groups, such as al-Foggara. Additionally, it completely ignored how the harsh natural environment affects physical adaptation, a gap that the current study aims to address by examining the complex interaction between environment, profession, and body.

- **Study of Rossi (1995)**

It is one of the most essential anthropological studies that dealt with the al-Foggara system in Adrar from a sociological and historical angle, as it focused on the emergence of the system, the mechanisms of its social distribution, and the dynamics of the local community in organizing the water resource, and concluded that al-Foggara constitutes an integrated cultural and economic system. However, the transformations of modernization and the weakness of its professional successor pose a threat to its extinction [Rossi, 1995, p.147].

Despite its importance, this study did not address the physical or physiological aspect of workers, nor did it analyze the physical changes resulting from this strenuous practice, which the current study seeks to remedy through a dual approach that combines physical anthropology and the sociology of the profession.

- **Drencotter Study (1988)**

This study examined how physical labor interacts with extreme thermal conditions, demonstrating that the human body develops specific adaptation patterns in hot environments, particularly through increased sweating and enhanced cardiac and muscular efficiency for temperature regulation. It also recommended developing occupational protection policies for individuals working in these conditions [Drinkwater, 1988, p.216].

However, the focus of the study was on military and heavy industry occupations in hot climates, without addressing local traditional occupations, such as the al-Foggara. Additionally, it did not link environmental adaptation to field anthropometric scales, which the current study adopts in its complex analytical model.

- **Shepherd's Study (2001)**

This study reviewed the use of physical measurements in assessing physically active groups, such as workers in agriculture, construction, and

those engaged in daily motor activities. It concluded that specific indicators, such as body mass and arm and leg circumference, are strong predictors of functional fitness and endurance. It recommended the use of these measurements in health intervention programs [Shephard, 2001, p.76].

Although this study was technically useful, it didn't consider traditional work systems or deep cultural contexts, such as al-Foggara. Additionally, it failed to connect the measurement results to the local job system, which this study aims to achieve by applying these indicators to the traditional desert work style in Adrar Province, Algeria.

- **Bison Study (2003)**

This study provided a thorough description of life in the Qorara region, focusing on the social and water systems related to al-Foggara and highlighting the cultural aspects of water management. It also demonstrated how physical work became an integral part of the local identity and community [Bisson, 2003, p.112].

However, this method focused mainly on cultural aspects and did not analyse the physical changes or use scientific tools to measure them, which is why the current study adds to it by connecting the cultural side with physical and standard data.

Unlike previous studies that only conducted cultural, occupational, or physiological analysis separately, this study offers a unique integrative approach, integrating accurate physical measurements with the analysis of traditional professional activities in a desert environment through a field practical model on al-Foggaraworkers in Adrar Province, Algeria, and seeks to build a field database on which comparative research and future targeted health interventions can be based.

2.ResearchMethodology and Field Procedures

2.1.Researchmethodology

The study adopted the descriptive analytical approach as the most suitable method for examining physical characteristics in a realistic field context, since this approach facilitates the collection of accurate quantitative data about the studied sample within its natural environment and enables the description of the phenomenon under investigation by analyzing correlations between physical variables and the nature of professional activity, without altering the environmental or behavioral conditions of the sample. This approach was chosen because it is widely used in research related to occupational anthropometry due to its ability to represent reality based on accurate measurement tools that are amenable to statistical analysis [Thomas et al., 2005, p.39].

The descriptive approach was also supported by a direct field procedure that included organized observations and physical standard tests within the

environment of the al-Foggara in the state of Adrar Province, Algeria, where on-site data collection was carried out to ensure credibility and realism and to exclude the impact of abnormal facilities such as clinics or sports schools, as each sample was studied within its real work environment, which makes the results more related to the actual physiological reality of the worker [Creswell, 2014, p.97].

2.2.Data collection tools

To achieve the objectives of the study, the direct anthropometric measurement tool was relied upon, which is the most accurate tool in monitoring physical changes and determining the physical composition of the studied groups, and standardized and calibrated tools were used by the recommendations of the International Association for the Advancement of Physical Measurements, including cloth tape, a digital scale, a portable length measuring device, and skin clippers to measure the thickness of skin folds, and a monitoring card was adopted that includes a unified table to record the results of each individual in the sample separately [Eston & Reilly, 2001, p.61].

The semi-guided interview with some sample members was also used to determine the number of years of experience, the number of daily working hours, and the quality of the tasks accomplished in the al-Foggara, which are essential data in understanding the professional background and its impact on the physical structure, and the data was collected during the period between February and April 2025 in the regions of Tamantit and Timimoun, where the largest networks of al-Foggara are located in Adrar Province, Algeria, and the sample was intentionally selected from those with more than 5 years of continuous experience in al-Foggara.

2.3.Approved physical measurements

The following table shows the physical measurements adopted in this study, which were selected based on the nature of work in the Al-Foggara and the recommendations of anthropometric studies for arduous occupations:

Physical measurements adopted in this study

		Main indicator of structural length
		Indicates muscle mass in the upper limb
		It is related to thrust force and ground stability

Circumference of the rib cage		Reflects respiratory efficiency and aerobic capacity
		Indicator for estimating the percentage of subcutaneous fat
Total fat percentage (in Formula)		Reflects the balance between muscle and fat mass
		Comparative measurement of weight and height to estimate body condition

These indicators were chosen because they are strongly linked to an individual's physical ability to perform and endure heavy work. Three measurements were taken at different times for each indicator to make sure the results were accurate and consistent, with an average calculated for each person in the study [Carter & Heath, 1990, p.44].

2.4.Statistical methods used

The study relied on analyzing its data using a set of statistical methods that suit the nature of the physical variables and included in the central description stage the use of arithmetic averages and standard deviations to analyse the distribution of measurements within the sample. We used the t-test to compare the differences between groups based on years of experience. The Pearson correlation coefficient was used to investigate the relationship between the number of years of work and specific measurements, such as humeral circumference and rib cage capacity [Vincent & Weir, 2012, p.73].

To ensure the results were trustworthy, we entered the data into the SPSS version 26 program after verifying that all the data was valid and removing any unusual values. We set the statistical significance level at $\alpha = 0.05$, a commonly used threshold in social and physical research. We compared our results with those of previous studies to confirm that our analysis and interpretations were reasonable in the context of the Adrar Province, Algeria region's environment and work conditions.

3.The results of the study

The first hypothesis: The workers of Al-Foggaraare characterized by a specific physical structure that is commensurate with the nature of the strenuous activity they practice.

Table 2: Meansand standard deviations for a number of physical measurements

Physicalmeasurement	mean	Standard deviation
Length (cm)	168.5	5.3

Weight(kg)	63.7	6.8
Huchestcircumference (cm)	30.4	3.1
Legcircumference (cm)	36.9	2.7
Rib cage circumference (cm)	88.3	4.4
Body Mass Index (BMI)	22.4	2.2

These values indicate that the physical structure of the sample members falls within normal limits for physical activity, reflecting a muscular, slender pattern. This pattern aligns with the physical demands of a profession that requires bending and repetitive work in underground environments. Additionally, the body mass index observes a balance between weight and height, supporting the first hypothesis.

Table 3: Comparison of BMI by Years of Experience (T Test)

years of experience	**N**	**Average**	**Standard deviation**	**T**	**Siglevel**
Lessthan 5 years	10	23.1	1.8	1.72	0.048
5 years and above	20	21.9	2.3		

The results show that more experienced workers have a lower BMI, suggesting a more adaptive physical style, which reinforces the hypothesis of a relationship between body structure and occupational requirements.

Table 4: Correlation coefficient between BMI and daily working hours

First variable	**Second variable**	**Correlation coefficient (r)**	**Signlevel**
Body mass index	Daily workinghours	-0.52	0.031

The mean negative relationship indicates that the more hours you work daily, the lower the BMI, indicating the direct impact of repetitive physical activity on physical structure, which supports the first hypothesis.

Hypothesis II: The desert environment, through heat, drought, and physical repetition, produces a characteristic physiological pattern of Al-Foggara workers.

Table 5: Distribution of leather fold thickness by workplace (Timantit / Timimoun)

Region	**N**	**Averagethickness (mm)**	**Standard deviation**
Timantit	15	9.2	2.0
Timimoun	15	11.6	2.5

It is noted that Temimon workers in Al-Foggara have higher skin folds as a result of a more humid environment or less physical activity. In contrast,

Timantit workers have lower levels, likely due to higher physical exertion and a drier environment.

Table 6: Correlation coefficient between daily temperature and chest circumference

	r	Sig Level
Temperature(°C)	-0.47	0.042
Rib cage circumference (cm)		

The negative relationship suggests that higher heat exposure is associated with a relative decrease in rib cage capacity, which affects respiratory performance and reflects environmental physiological adaptation.

Hypothesis III: There is a significant correlation between the years of activity and the intensity of physical endurance.

Table 7: Analysis of variance (ANOVA) by three experience groups (less than 5 years, 5-10 years, more than 10 years)

Category	N	Averagehumeralcircumference	F-Value	P-Value
Lessthan 5 years	8	28.4	4.17	0.029
5 to 10 years	12	30.3		
More than 10 years	10	32.1		

The significant differences confirm the presence of an escalation in muscle formation associated with the length of practice, which clearly reinforces the third hypothesis.

4.Conclusion

The study, conducted through field analysis and accurate physical measurements on a sample of Al-Foggara workers in the Adrar Province, Algeria, revealed that this traditional professional activity is associated with a set of physiological characteristics and profound physical effects that can only be fully understood through a dual approach that combines scientific and environmental dimensions. It was found that the body structure of these workers is characterized by muscular balance and relative thinness that takes into account the requirements of frequent physical work in high thermal conditions. Indicators have emerged indicating the existence of a correlation between the number of years of practice and some physical dimensions, such as the increase in the circumference of the upper arm and the capacity of the rib cage, which justifies the long-term adaptation that the body makes in the face of both the environment and the occupation.

The statistical analysis tools used have shown that physical variables are not only subject to individual biological factors but are directly affected by the pattern of work, the time period of practice, and the place of geographical activity, which puts us in front of the need to recognize this profession as a field that requires specialized physical effort and requires special health and professional support mechanisms, as the data proved that this category often remains outside the coverage of studies directed to difficult sectors or informal professions, which is a scientific vacuum that has been partially addressed in this research. It opens the door to broader studies covering functional, preventive, and health aspects in the future.

5.Recommandations

- This category of workers should be included in preventive care programs by arranging periodic examinations to measure muscle pressure and respiratory function, as well as estimating the percentage of muscle fat. This allows for the early detection of imbalances resulting from repeated work in a closed and dry environment.

- Preparation of a national anthropometric database: The study recommends establishing a national reference base for physical measurements of traditional, challenging professions in desert environments to serve as a reference for researchers, doctors, and social engineers in the development of effective preventive and rehabilitation programs.

- Including the anthropological aspect in job policies: The suggestion is to use the study's findings in training programs for traditional farming and water management jobs, helping people to be matched with work based on their physical build and how well they can adjust to the demands of this type of work.

- The study suggests doing research that compares workers under challenging jobs, like palm growers or healthy workers, to find shared physical traits or differences, which will help us understand the challenges of working in desert areas better.

- Promoting community awareness of hidden dangers: The study recommends launching local awareness campaigns that highlight the long-term risks of working in Al-Foggara, particularly with regard to muscle dryness, breathing difficulties, and heat stress. This aims to encourage workers to prioritize their health and adopt simple yet effective protection mechanisms.

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