

Epidemiological Profile of Dermatitis among Automobile Repair and Maintenance Garages in the City of Parakou in 2020

Fabien Christophe Ahoya Gounongbé^{1*}, Nadège Agbessi¹, Ibrahim Mama Cissé¹, Antoine Vikkey Hinson²

¹Faculty of Medicine, University of Parakou, Parakou, Benin

²Faculty of Health Sciences of Cotonou, University of Abomey, Calavi, Benin

Email: *gcfabien@yahoo.ca, ghislainsop@yahoo.fr, owonaspinker@yahoo.fr, adoukonouthierry@yahoo.fr

How to cite this paper: Gounongbé, F.C.A., Agbessi, N., Cissé, I.M. and Hinson, A.V. (2022) Epidemiological Profile of Dermatitis among Automobile Repair and Maintenance Garages in the City of Parakou in 2020. *Open Journal of Epidemiology*, 12, 481-491.

<https://doi.org/10.4236/ojepi.2022.124038>

Received: July 9, 2022

Accepted: November 14, 2022

Published: November 17, 2022

Copyright © 2022 by author(s) and Scientific Research Publishing Inc. This work is licensed under the Creative Commons Attribution International License (CC BY 4.0).

<http://creativecommons.org/licenses/by/4.0/>



Open Access

Abstract

Background: Occupational dermatoses, also called occupational dermatitis or occupational dermatitis, are very common in the workplace and are still a topical subject. All over the world, especially in developed countries. They handicap the professional activities of the workers. **Purpose:** To determine the epidemiological profile of dermatosis among automobile repair and maintenance garages in Parakou. **Methods:** It was a cross-sectional and descriptive study carried out from 20 April to 17 May 2020. The sampling method was non-probabilistic. Data collected from a questionnaire, clinical examination and worksite observation were analyzed with Epi Info 7.2.2.1 software. **Results:** The participation rate was 98.08%. The sex ratio (male/female) was 178. The mean age of the respondents was 25.80 ± 10.22 years. Respondents with less than 5 years of experience in the field were 61.22%. Mechanics were the most numerous. In the sample, 95.81% had frequent skin contact with fuels, 84.08% had contact with motor oils and 15.92% had contact with dilute battery electrolyte solutions. The frequency of dermatosis was 73.46%. Hands and wrists were the most affected seats (47.35%). Some (33.84%) wore them before the start of the activity in the garage but in 66.22% of them, the dermatosis had occurred because of their arrival in the garage. Among these skin diseases, keratoderma predominated at 80.01%. **Conclusion:** Dermatitis is very common among garage owners in Parakou.

Keywords

Dermatitis, Garage Owners, Automotives, Parakou

1. Introduction

One of the most important distinctions made by the International Labor Organization (ILO) are diseases resulting from work-related exposure, such as cancers, and diseases affecting functions and organs, such as dermatosis [1]. Occupational dermatosis, in this case, is very common in workplaces. They are still relevant in spite of prevention actions [2]. Their incidence has increased in recent years due to industrial development, incorporating new materials in the work, synthesis of chemical substances for production, inappropriate use of cleaning products, and insufficient training of workers in preventive measures, with particular emphasis on general and individual hygiene. These pathologies are encountered in worksites around the world. Clinical aspects are diverse [3]. In France, occupational dermatosis accounts for more than 50% of occupational diseases and made up about 10% of skin diseases by 2005 [2]. In Tunisia, the annual incidence of occupational allergic contact dermatitis was estimated at 32 cases per 100,000 workers between 2002 and 2012 [3]. In Morocco (2000), the prevalence of occupational dermatosis was 84.70% among mechanics in garages [4]. There are many different sectors of activity that can cause occupational dermatosis. Automotive repair and maintenance is one of them. It mobilizes various skills (mechanics, bodyworkers, painters, electricians, welders, vulcanizers, and refrigeration technicians) gathered in a functional entity that is the car garage. Like any other sector of activity, it is full of risk factors for dermatosis. And these factors are constantly changing [4]. They can be physical, chemical and/or infectious. In Benin, the repair and maintenance of automobiles has grown spectacularly in the last two decades due to the increasing number of imported second-hand vehicles (cars, buses, trucks). Several thousand of these vehicles are imported and released on road each year [5] [6]. Given the involvement of different categories of workers and especially the handling of various products, it seemed necessary to conduct a study to investigate and to determine the epidemiological profile of dermatosis among automobile repair and maintenance garages in Parakou.

2. Study Design

This was a cross-sectional and descriptive study done from April 20 to May 17, 2020. It focused on car repair and maintenance garages in the city of Parakou. The study included all garage owners present in their garage during the collection period who gave their free and informed consent to participate. It was a non-probability sampling by exhaustive census of garage owners. Data collection was done by means of a questionnaire which includes 42 items (see **Annex**) developed by ourselves during a face-to-face interview with the respondent, a dermatological examination of those found to have any skin lesions, and observation of the worksites. The dermatological examination was performed by a skin specialist without paraclinical examination. The variables studied were dermatological lesions, sociodemographic features (age, sex, nationality, ethnicity, level

of education), occupational features (category, work position, seniority), dermatological history, and dermatosis risk factors (substances handled, microtrauma). The data collected were processed and analyzed using Epi Info software version 7.2.2.1.

3. Results

A total of 358 people were surveyed out of 365 contacted, for a participation rate of 98.08%. There were two females and 356 males, giving a sex ratio (male/female) of 178. The mean age of the respondents was 25.80 ± 10.22 years. Youngests were 10 years old and the oldest were 61 years old. There were 56.43% in the 14 - 25 age group, 2.51% less than 14 years old and 61.22% less than 5 years in the business. Mechanics constituted 65.64% of the sample. In this sample, 95.81% had frequent skin contact with fuels, 84.08% had contact with motor oils and 15.92% had contact with dilute battery electrolyte solutions. With bare hands, 100% handled rubber, 95.53% handled glues and/or sealants and 22.91% paint. All of them had suffered at least one micro trauma to their skin. The remaining socio-professional features are shown in **Table 1**. Overall, 263 subjects had dermatosis, *i.e.*, 73.46%. Mechanics were affected by all types of dermatosis diagnosed (see **Table 2**). About 121 (33.80%) of the respondents had dermatological lesions at the beginning of their activity of repair and maintenance of automobiles. In 237 (66.20%), the dermatosis had occurred during exercise. Of all the dermatosis found on the subjects, keratoderma came first with 80.01%. **Figure 1** and **Figure 2** illustrate the type of keratoderma that affected the respondents, particularly the mechanics. In the mechanics' corporation, 84.89% suffered from keratoderma, 73.33% from contact eczema and 53.33% from inflammatory dermatosis (see **Table 3**). The hands and wrists were the body sites of 47.35% of the dermatological lesions. Keratoderma was located more frequently (85.6%) on the hands and wrist, while inflammatory dermatoses were found in 60% of cases on the arm and forearm (**Table 4**).

Table 1. Distribution of respondents by age, seniority, occupation and risk factors, *Parakou*, 2020 (N = 358).

	Headcounts	Percentage
Age (year)		
<14	9	2.51
[14 - 25[202	56.43
[25 - 35[76	21.23
[35 - 45[40	11.17
≥45	31	8.66
Seniority		
Less than a year	54	15.21
[1 - 5 years[165	46.01
≥5 year	139	38.78

Continued

Occupational group		
Mechanic	235	65.64
Sheet metal worker-painter-bodybuilder	61	17.04
Electrician	38	10.61
Vulcanizer	10	2.54
Welder	9	2.51
Refrigeration mechanic	4	1.12
Others*	3	0.24
Category		
Graduates	137	38.97
Apprentice	221	61.73

*: Radiator unclogger; automatic transmission specialist.

Table 2. Distribution of respondents according to the time of occurrence of dermatosis, *Parakou, 2020.*

	Existing and not aggravated by work	Existing and aggravated by work	Occurrence at work
	n (%)	n (%)	n (%)
Keratoderma (N = 139)	6 (4.32)	19 (13.67)	114 (80.01)
Acne (N = 70)	24 (34.29)	22 (31.42)	24 (34.29)
Pityriasis versicolor (N = 20)	11 (55)	1 (5)	8 (40)
Contact dermatitis (N = 15)	0 (0)	-	15 (100)
Other mycotic infections (N = 16)	1 (6.25)	4 (25)	11 (68.75)
Contact urticaria (N = 11)	0 (0)	-	11 (100)
Inflammatory dermatosis (N = 15)	1 (12.50)	0 (0)	14 (93.33)
Lichen (N = 05)	0 (20)	0 (0)	4 (80)
Dyschromia (N = 05)	3 (60)	0 (0)	2 (40)
Prurigo (N = 02)	0 (0)	1 (50)	1 (50)

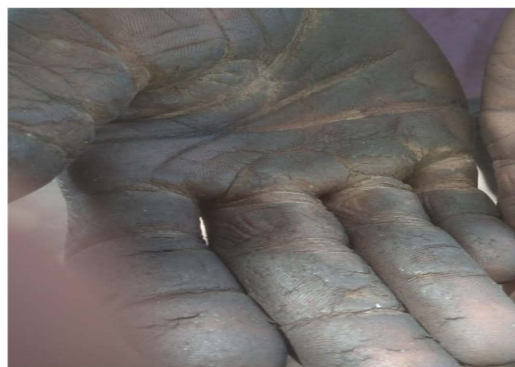


Figure 1. Palmoplantar keratoderma fissure in a garage mechanic, *Parakou 2020.*



Figure 21. Irritation dermatitis of the right hand in an electrician mechanic, *Parakou* 2020.

Table 3. Distribution of dermatosis types according to the professional activity in the garage, *Parakou*, 2020.

	Mechanics	Sheet metal worker	Welder	Electrician	Other*
	n (%)	n (%)	n (%)	n (%)	n (%)
Keratoderma (N = 139)	118 (84.89)	9 (6.47)	1 (0.72)	8 (5.76)	3 (2.16)
Acne (N = 70)	54 (77.14)	11 (15.71)	0 (0)	5 (7.14)	0 (0)
Pityriasis versicolor (N = 20)	13 (65)	3 (15)	0 (0)	4 (20)	0 (0)
Contact dermatitis (N = 15)	11 (73.33)	4 (26.67)	0 (0)	0 (0)	0 (0)
Other mycotic infections (N = 16)	9 (56.25)	7 (43.75)	0 (0)	0 (0)	0 (0)
Contact urticaria (N = 11)	9 (81.82)	2 (18.18)	0 (0)	0 (0)	0 (0)
Inflammatory dermatosis (N = 15)	8 (53.33)	2 (13.33)	1 (6.67)	4 (26.67)	0 (0)
Lichen (N = 05)	2 (40)	1 (20)	0 (0)	2 (40)	0 (0)
Dyschromia (N = 05)	3 (60)	1 (20)	0 (0)	0 (0)	1 (20)
Prurigo (N = 02)	1 (50)	1 (50)	0 (0)	0 (0)	0 (0)

*Others: Vulcanizer, refrigeration specialist.

Table 4. Distribution of respondents depending on the location of the dermatological lesions, *Parakou*, 2020.

	Face and neck	Trunk	Arm and forearm	Hand and wrist	Leg and foot
	n (%)	n (%)	n (%)	n (%)	n (%)
Keratoderma (N = 139)	0 (0)	0 (0)	0 (0)	119 (85.6)	20 (14.4)
Acne (N = 70)	68 (97.1)	4 (5.7)	0 (0)	0 (0)	0 (0)
Pityriasis versicolor (N = 20)	9 (45)	14 (70)	0 (0)	0 (0)	0 (0)
Contact dermatitis (N = 15)	0 (0)	0 (0)	0 (0)	15 (100)	1 (6.7)
Other mycotic infections (N = 16)	0 (0)	0 (0)	0 (0)	0 (0)	10 (62.5)
Contact urticaria (N = 11)	0 (0)	4 (36.4)	7 (63.6)	0 (0)	0 (0)
Inflammatory dermatosis (N = 15)	3 (20)	4 (26.7)	9 (60)	3 (20)	0 (0)
Lichen (N = 05)	0 (0)	0 (0)	1 (20)	5 (100)	1 (20)
Dyschromia (N = 05)	0 (0)	1 (20)	2 (40)	1 (20)	1 (20)

Prurigo (N = 02)	0 (0)	0 (0)	1 (50)	0 (0)	1 (50)
------------------	-------	-------	--------	-------	--------

4. Discussion

Almost all the respondents were male, with a sex ratio of 178. In a study carried out in Morocco on garage mechanics in 2000, Bichara and colleagues found that 100% of the respondents were male [4]. The average age of our respondents was 25.80 ± 10.22 years. The age group 14 - 25 years was the majority at 56.43%. A French series (2011) conducted by Géraut and colleagues reported a similar age average (34 years) in mechanics and bodywork-painters [7]. In Ivory Coast (2006), Yoboué and al observed that 10- to 25-year-olds (74.20%) predominated among car mechanics in Abidjan [8]. In Morocco, the under 30 years old were the most represented (67.80%) [4]. There is therefore a high number of young people in the automotive repair and maintenance professions in Africa. This is an expression of the gains that can be made from automotive repair. The near absence of women in automotive maintenance and repair is an expression of the physical stamina required for the job. This fact does not deviate from the perception of some African populations that certain occupations are reserved for the male gender. Subjects under 14 years of age represented 2.81% of the sample. However, the minimum age required to learn a trade in Benin is 14 years [9]. This shows that work legislation is not respected in the country. It is the expression of laws that do not really take into account the socio-cultural environment. In Benin, recourse to apprenticeship often occurs after repeated school failures or the inability of parents to ensure the schooling of their children. The very low rate (1.12%) of respondents with a vocational diploma obtained in a training school is indicative. The rate of Moroccan garage workers with a diploma was twice as high (3%) as that of their counterparts in Parakou [4]. Apprentice training in garages is empirical. As a result, bad habits such as washing hands with fuel and not using protective equipment are also acquired. Thus, the vicious circle of today's bad boss forming tomorrow's bad boss is perpetuated in all on-the-job training. As the activities in a car garage are diverse, the risk factors are as varied and numerous. Only 8.63% of the subjects had appropriate work clothes. A study done in France showed that in casual welding workshops, the rate of users of personal protective equipment was much higher (46.67%) in 2011 [10]. About three out of four of our respondents had at least one dermatosis. If the research was restricted to the participants' statements, the frequency of dermatosis would be 15.92%. But on basis of the dermatological examination 73.46% of the respondents were diagnosed. The most affected were mechanics at 84.89% for keratoderma alone. The Moroccan study by Bichara's team (2000) found a similar frequency (84.70%) among mechanics [4]. This would lead to the conclusion that the working conditions are also similar in the garages of these two African countries. However, in Ivory Coast (2006), according to the study by Yoboué and al [8], 100% of mechanics in Abidjan were affected by these skin diseases. Keratoderma was also found in Moroccan mechanics with a

lower frequency of 73.70% [4]. During the observation phase, most of the mechanics' activities required the manual use of work tools (wrenches, screwdrivers, hammers) resulting in friction with the palms. This contributes to contact eczema, which affected 6.38% of our mechanics. In France, the Crépy study reached a higher frequency of 15% among car mechanics. The low frequency of these dermatosis in black subjects compared to the French (white race) is consistent with Crépy's hypothesis that the black race is more resistant to irritants [10].

5. Conclusion

Dermatosis due to car repair and maintenance work in Parakou varies. Mechanics are the most affected of all the guilds working in garages. Working conditions and failure to comply with preventive measures are the main causes behind the occurrence of these diseases. It is therefore necessary to undertake studies to assess the level of knowledge of mechanics with regard to the prevention of skin risks related to their work to ensure that they receive appropriate training on the problem.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

References

- [1] Organisation Internationale du Travail (2010) Liste des maladies professionnelles. Genève.
https://www.ilo.org/safework/info/publications/WCMS_125160/lang--fr/index.htm
- [2] Kolsi, M., Mansour, H.B., Nouaigui, H. and Ben Laiba, M. (2005) Dermatoses professionnelles: une bonne connaissance de la pathologie pour une meilleure prévention. *Institut de Santé et de Sécurité au Travail*, **33**, 2-19.
- [3] Maoua, M., Kalboussi, H., Aloui, A., Chatti, S., Kacem, I., Guedri, S. and al. (2017) Patch tests aux produits manipulés en milieu professionnel: quel apport? Épidémiologie des dermatites de contact allergiques professionnelles en Tunisie Dermatite atopique : facteurs associés et apport des prick tests en milieu hospitalier camerounais. *Revue Française d'Allergologie*, **57**, 239-240.
- [4] Bichara, M., Verger, C., Caubet, A., Maani, A. and Laraqui, C.H. (2000) Prévalence des dermites de contact chez les mécaniciens automobiles. *Revue Française d'Allergologie et d'Immunologie Clinique*, **40**, 612-617.
- [5] Institut National de la Statistique et de l'Analyse Économique (2008) Importation et transit de véhicules d'occasion au Bénin. Cotonou, 23 p.
<https://instad.bj/images/docs/insae-publications/autres/Etudes-Commerce-X/Importation%20et%20Transit%20Vehicules%20Occasion%202008.pdf>
- [6] Ministère des Infrastructures et des Transports du Bénin, Direction de la Programmation et de la Prospective (2017) Annuaire statistique 2013-2016. Cotonou.
https://transports.bj/wp-content/uploads/2018/03/Annuaire_Statistique_TPT_2013_2016_VF.pdf

- [7] Géraut, C., Cleenewerck, M.B., Martineau, J., Géraut, L. and Tripodi, D. (2011) Risques cutanés chez les mécaniciens-garagistes et chez les tôliers-carrossiers. *Progrès en Dermato-allergologie*, **10**, 115-131.
- [8] Yoboué, P., Sangaré, A., Écra, E. and Kaloga, M. (2006) Les risques cutanés chez les garagistes: mécaniciens et tôliers-carrossiers à Abidjan, Côte d'Ivoire. In: GERDA. 27^{ème} cours d'actualisation en dermato-allergologie du, 21-23septembre 2006, Toulouse.
- [9] Institut National de la Statistique et de l'Analyse Économique (2010) Les entreprises artisanales au Benin. Cotonou.
<https://instad.bj/images/docs/insae-statistiques/enquetes-recensements/Recensement-General-des-Entreprises/Rapport-Artisanat-RGE2.pdf>
- [10] Crépy, M.N. (2011) Dermatitis de contact professionnelles chez les mécaniciens. Fiche d'allergologie-dermatologie professionnelle TA 89. *Documents Pour le Médecine du Travail*, **127**, 487-502.

Annex: Survey Sheet

I-Socio-professional identification

Q1-How old are you (year)?		
Q2-Your gender	1 = Male	2 = Female
Q3-What is your profession in the garage?	1 = Mechanic 3 = Welder 5 = Vulcanizer 7 = Other (specify).....	2 = Sheet metal worker-painter 4 = Electrician 6 = Refrigeration mechanic
Q4-Where did you learn your trade?	1 = Vocational school 2 = Learning 3 = Other (specify):.....	
Q5-What is your title in the garage?	1 = Garage manager 3 = Apprentice 4 = Other (specify)	2 = Sector manager
Q6-How long have you been doing this job?	1 = Less than a year	2 = 1 - 5 years 3 = 5 years and over
Q7-Do you work outside the garage?	1 = yes	2 = No
Q8-Where did you learn your profession?	1 = Maintenance agent 3 = Cultivators 5 = Other (specify).....	2 = Motorcycle taxi 4 = Gardening

II-Dermatological examination

Q9-Do you suffer from:			
a-Allergic conjunctivitis	1 = Yes	2 = No	3 = Don't know
b-Allergic rhinitis	1 = Yes	2 = No	3 = Don't know
c-Asthma	1 = Yes	2 = No	3 = Don't know
d-Sinusitis	1 = Yes	2 = No	3 = Don't know
e-Food allergy	1 = Yes	2 = No	3 = Don't know
Q10-Have you ever suffered from dermatosis since you came to the garage?	1 = Yes	2 = No	
Q11-If yes, specify its head office	1 = Hand 5 = Other (specify).....	2 = Feet	3 = Trunk 4 = Face
Q12-Did you have these lesions before arriving at the garage?	1 = Yes	2 = No	
Q13-If yes, are they aggravated with work?	1 = Yes	2 = No	
Q14-What is the initial site of the lesions?	1 = Face 3 = Feet	2 = Hands	4 = Other (specify).....
Q15-Do the lesions improve after being out of the garage for several days in a row?	1 = Yes	2 = No	
Q16-What are the associated subjective symptoms?	1 = Burn	2 = Pruritus	
Q17-Do these lesions exist in other people?	1 = Yes	2 = No	
Q18-How do the lesions present?	1 = In medallion, cupboard, or tablecloth 2 = Scattered 3 = Seeding 3 = Other (specify).....		

Continued

- Q19-Where are the lesions located?
- 1 = Visage
 - 2 = Neck
 - 3 = Hands
 - 4- Wrist
 - 5 = Forearm
 - 6 = Trunk
 - 7 = Genitals
 - 8 = Feet
 - 9 = Other (specify).....
- Q20-Basic lesions:
- 1 = Erythematous lesions
 - 2 = Erythematous-crusted lesions
 - 3 = Vesicular lesions
 - 4 = Papular lesions
 - 4 = Papulo-vesicular lesions
 - 5 = Hyperkeratotic lesions
 - 6 = Fissured lesions
 - 7 = Scaly lesions
 - 8 = Bullous lesions
 - 9 = Macular lesions
 - 10 = Micro-cystic lesions
 - 11 = Pustular lesions
 - 12 = Comedones
 - 13 = Tumor lesions
 - 14 = Other (specify).....
- Q21-Diagnosis retained
- 1 = Contact eczema
 - 2 = Keratoderma
 - 3 = Ulceration
 - 4 = Pityriasis versicolor
 - 5 = Other cutaneous mycoses
 - 6 = Acne
 - 7 = Hives
 - 8 = Dyschromias
 - 9 = Psoriasis of the hands
 - 10 = Neoformations
 - 11 = Atopic dermatitis
 - 12 = Other.....

III-Job study

- Q22-What type of vehicles do you work on? 1 = Petrol 2 = Diesel 3 = Both
- Q23-Is fuel spilling on your body? 1 = Yes 2 = No
- Q24-Do you handle motor oils? 1 = Yes 2 = No
- Q25-If yes, do they pour on your body? 1 = Yes 2 = No
- Q26-Do you handle battery electrolyte solutions? 1 = Yes 2 = No
- Q27-If yes, do these solutions pour on your body? 1 = Yes 2 = No
- Q28-Do you handle rubber objects (tires, inner tubes) with bare hands? 1 = Yes 2 = No
- Q29-Do you handle glues and sealants with bare hands? 1 = Yes 2 = No
- Q30-Do you handle paintings with your bare hands? 1 = Yes 2 = No

Continued**IV-Means of prevention**

Q31-Do you have the recommended “overalls”?	1 = Yes	2 = No
Q32-If yes, do you always wear it at work?	1 = Yes	2 = No
Q33-Do you have recommended work shoes?	1 = Yes	2 = No
Q34-If yes, do you wear them every day at work?	1 = Yes	2 = No
Q35-Do you have protective gloves for work?	1 = Yes	2 = No
Q36-If yes, do you always wear it at work?	1 = Yes	2 = No
Q37-What material are the gloves you are wearing?	1 = latex	2 = rubber
	3 = leather	4 = fabric
	5 = Other (specify).....	
Q38-Do you have a clear water point in the garage?	1 = Yes	2 = No
Q39-Do you wash your hands after work?	1 = Yes	2 = No
Q40-If so, what do you do it with?	1 = Water	2 = Gasoline
	3 = Diesel	4 = Brake oil
	5 = Other (Specify).....	
Q41-Do you wipe your hands after washing?	1 = Yes	2 = No
Q42-If so, with what?	1 = Quick drying on workwear	
	2 = Parts cleaning cloth	
	3 = A specially reserved linen	
	3 = Other (Specify).....	