Human comfort indicators in the city of Baghdad-Iraq

Ali A K Al-Waeli and Kadhem H M Al-Asadi

Abstract—**Comfort concept is a relative concept differs from person to person and from time to time and even for the same individual at different times. Also, the large numbers of variables that affect the sense of comfort role 's hard to be found a single measure accurately that could be adopted in the measurement. Especially that some of the variables are physiological and psychological. In this paper, the comfort of peoples live in the city of Baghdad, Iraqi capital were studied from point of view of the effective temperature guide (day and night), the presumption of happiness and pleasure, the presumption the bio-meteorological temperature, wind cooling guide, and the affecting heat proof surface in terms of solar radiation and wind.**

***Index Terms*— comfort indicators; temperature; wind cooling; solar radiation; Baghdad**

I. Introduction

THE site of the city of Baghdad astronomer between latitudes (33-10º and 33-25º) and the lack of vulnerability neighboring seas has a significant impact in making its climate distinct. The winter is cold, and the summer is hot. In winter, the temperatures drop because of the short daylight period, and the tendency of the low angle of the sun rays fall, as well as the region's vulnerability to the sovereignty of the cold continental polar air masses that lead to a severe drop in temperatures [1]. The air temperature in the summer increase significantly because of the clarity of the sky and they are free of the clouds throughout the day. The region exposed to the continental warm tropical air masses [2].

The climatic factors affect the human comfort and his mental production. An example of these elements: the solar radiation, temperature, relative humidity, wind. These items have been used by researchers to measure the human comfort in different parts of the world.

The aim of the study is to define the comfort conditions for the Baghdadi citizens depending on the environment conditions. This work is a part of continuous efforts of the Iraqi Organization for Desertification and Pollution [4-49].

II. The Study Site

Baghdad city has a central location in the central Iraq in Baghdad province. Baghdad has an area of 1471106 km2, which make up 0.2 % of the area of Iraq amounting to 438 446 square kilometers. Its location is classified as nodal sites due to the occurrence of the differentiated downtown geographic regions. It west is bordered by the desert region and the Middle undulating land on the south by the alluvial plain. A location is an ideal place mediates Iraq. The Tigris River penetrates the city of Baghdad and cuts it into two parts (Fig. 1).

The composite clues equations (with two climate elements) and the equations of the climate component per the study area were used, to determine the level of comfort for the people in the city of Baghdad in any month of the year, day and night.

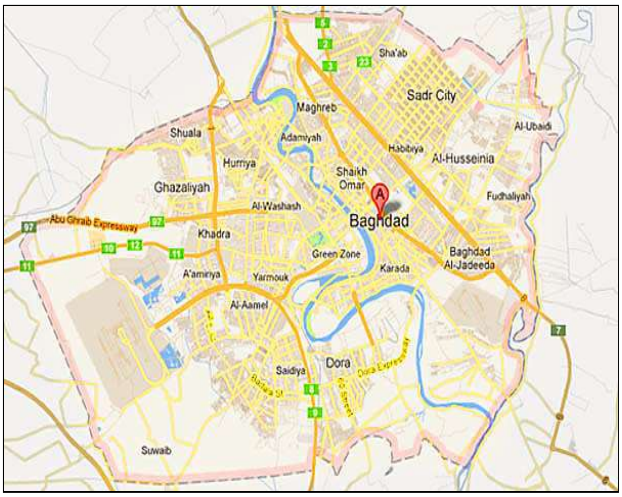

Fig. 1, Baghdad city map

A. First: the effective temperature guide

1- The average effective temperature

The following equation was used to find the average effective temperature.

$$ET = Tair - 0.55\ (1- (RH/155)\ (Tair - 14)$$

Where: ET- the effective temperature
RH- relative humidity
Tair- air temperature.

When applying the equation of actual temperature in the city of Baghdad to know the extent of human feeling comfortable. We've been relying on monthly averages for temperature and relative humidity in the application of the equation. The effective temperature averaged for the months

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December, January; February were 11.3, 11.7, and 12.4, respectively (Table I). So, these months fall within the climate are comfortable because of the low temperatures. The effective temperature averaged for the months March, April, and May was of 15.5, 21.6, and 23.6, respectively. So, these months fall within the comfortable and transitional climate. When comparing to the months of June, July, and August, the degree of its effective average temperature were 26.3, 26.6, and 25.5, respectively.

TABLE I
EFFECTIVE TEMPERATURE GUIDE (ºC) FOR THE CITY OF BAGHDAD

Data	Jan	Feb	March	April	May	June	July	August	Sep	Oct	Nov	Dec
Guide	11.7	12.4	15.5	21.6	23.3	26.3	26.6	25.4	24.2	21	16.2	11.3

TABLE II
EFFECTIVE COMFORT MONTHS FOR THE CITY OF BAGHDAD

Data	Months
Nagging months because of the low temperatures less than 18.9ºC	November, December, January, February and March
Comfortable months (ideal atmosphere) 18.9 to 22.8ºC	April and October
Nagging months, higher than the likely 22.9 to 24.4	May and September
A very annoying months (more than 24.4)	June, July and August

When compared with the staircase of sufficient temperature we find that they fall within the uncomfortable climate, because of the severe rise in the temperatures of these months as shown in Table I. These rates began to decline marked during the months September, October, and November, respectively. Tables I and II clarify the following:

A- Nagging months due to low temperature: turns out that the months November, December, January and February months was disturbing to the population as the presumption of sufficient temperature which stood at 11.3 for the month of December and 16.2 for the month of November, according to pose this presumption months uncomfortable.

B- Comfortable months: The months in April and October were two comfortable months for the city of Baghdad, with the value of presumption of 21.6 and 21 and so Baghdadis feel comfortable through.

C- Nagging months: that rising average temperatures during the months of May and September caused the increase in effective presumption to reach 23.2 and 24.2, so be feeling comfortable troublesome higher than the likely

d- Very annoying months: The months of June, July and August are very irritating dwelling through higher value presumption ranging between 25.4 - 26.6 ºC making the population feel uncomfortable and deeply disturbing.

2- Effective day temperature: The adoption of maximum temperature rates and lower relative humidity to extract the presumption rest day of the study area. Table 3 shows that the effective temperature of day-to-month in December, January and February of 15.7, 14.7, and 16.1, respectively. From Tables III and IV are located within these months the transition of the climate comfort and whether or not due to low temperatures and high rates of relative humidity. The climate is ideal during the month of March (18.5) and an effective temperature for the months of April and May rate of 21.6 and 24.9 respectively. When comparing the results of the application of the equation of effective temperature per day with the effective temperatures to adopt the effective rates of heat represented by months of June, July and August amounted to about 27.3, 28.5 and 28.3 respectively. By comparison, it is found to be within the spam warm above the likely climate. Because this climatic situation scale of 27-28ºC, which limit the conduct human events and activities without direct influential pressure to reduce climate. This is due to the warmer sun-synchronous movement of the heat of the summer in a June 21 coup amounts to an effective degree daytime temperature of the month in September, the October and November rate of 26.6, 23.3, and 18.5, respectively, within comfortable months when compared with the blessings of temperatures effective in Tables III and IV.

TABLE III
EFFECTIVE TEMPERATURE DAY MANUAL (ºC) TO THE CITY OF BAGHDAD

Data	Jan	Feb	March	April	May	June	July	August	Sep	Oct	Nov	Dec
Guide	14.7	16.1	18.5	21.6	24.9	27.3	28.5	28.3	26.6	23.3	18.5	15.7

TABLE IV
THE MONTH'S EFFECTIVE DAY FOR THE CITY OF BAGHDAD

Data	Months
Nagging months because of the low temperatures	December, January, February and March
Comfortable months	April
Nagging months because of high temperatures	June, July and August, May and September, October and November

3- Effective night temperature: The adoption of minimum temperature rates and the higher relative humidity to extract the presumption Night comfort in the study area and the application of this equation on the study area illustrated in Table III. It is clear that the effective night temperature for December and January and February were 5.7, 0.4, and 6.4, respectively (Table V and VI). These months fall within the climate spam uncomfortable because of the low temperatures and increased rates of relative humidity during the night in the study area.

TABLE V
A GUIDE EFFECTIVE TEMPERATURE OVERNIGHT IN THE CITY OF BAGHDAD FOR THE PERIOD (1981-2010)

Data	Jan	Feb	March	April	May	June	July	August	Sep	Oct	Nov	Dec
Guide	4.4	5.8	21.8	24.9	24.8	25.1	25.2	25.2	22.4	22.7	18.9	5.5

TABLE VI
THE MONTH'S EFFECTIVE DAY FOR THE CITY OF BAGHDAD

Data	Months
Nagging months because of the low temperatures	December, January, February and March and November
Comfortable months	March, April, May and September, October
Nagging months because of high temperatures	June, July and August,

The climate is in March is cooler as the effective night temperature of this month was 9.8 while the effective night temperatures for April and May were 24.9 and 24.8, respectively. These two months are within the transitional climate between comfort and whether or not to have it, where the air closest to the ideal. Table V shows that the climate is not likely during June, July, and August with a rate of 25.1, 25.2 and 25.2, respectively. When compared to the month of September (22.4), it turns out that the climate of this month has idealism for the convenience of man to engage in activities and events without any influential. But after the coup in the autumn, September- 23, the presumption of effective heat begins to decrease, and this climate is ideal tilted to the cooler before the month of October at a rate of (22.7). The month of October amounts to effective temperature overnight of 18.9, so the climate is troublesome cold for this month as Table 5 represents.

B. Second: the presumption of happiness and pleasure

The general equation of happiness and pleasure is:

In case of: PlS = 0.39 TS + 15.4, TS<36.1, then cooling the body.

In case of: PLS = 2.2 W + 1.95, case TS<36, then temper organize.

Where: W-skin humidity (constant value= 0.04%).

TS- Skin temperature (ºC).

The application of the presumption of happiness and pleasure in the study area for the purpose of knowing the extent of human feeling comfortable or not has been relying on rates of temperature in the application of this equation. The presumption of happiness and pleasure recorded the highest value during the months of June and July at a rate of 7 to high temperature as shown in Table VII. These months are considered unhappy and never feel comfortable during which the individual due to high temperatures while these rates start to decline gradually in September, October, and November at a rate of 6.6 0.6, and 5.3, respectively (Table VII). Despite the low temperatures rates for these months, they are unhappy months compared to a ladder of happiness and pleasure. December is one of the miserable month's degrees HE of 4.7 because of the low temperatures. For the months of January and February amounted to rate the level of happiness and pleasure 4.7 and 4.8, respectively, due to the drop in temperature. The month of March is a happy month with a degree of HE=5.2 on the happiness scale. Also, the month of April is a happy month with a degree of HE=5.9 as Table VII reveals. May is not a happy month, because of its proximity to the summer months and much more comfortable 4.9 as Table VII illustrates.

The application of happiness and pleasure of the city of Baghdad equation data results show that all the months are unhappy months. The equation has been applied more than four times, and the results were identical. So, the equation of happiness and pleasure is unsuitable for application to the city of Baghdad. It has been applied to the equation of happiness and satisfaction using the maximum temperatures during the day and minimum temperatures for the night to find the presumption of pleasure for day and night.

Table VIII shows the results of the application of the equation on the presumption of the day. The result was for all months (is never happy) because all the results have more than 5. This confirms the lack mentioned above of appropriate application of this presumption on Baghdad weather station. The same thing applies to the use of this equation for the night. Table IX shows the scale sign of happiness and pleasure for the evening. It is clear that all the months were never happy, except for the months of October and November, which was the context them unhappy.

C. The presumption the bio-meteorological temperature:

1. The general heat bio-meteorological Equation is:

$$tb = \frac{ta + tw}{2}$$

Where: t_w- wet bulb temperature

t_a- aerodynamic temperature which is calculated from:

$$ta = tm = -\frac{0.9311 + 0.0295\ V^n\ (tm - t)}{0.03 + 0.0295\ vr^n}$$

Where V-air speed

t_a- air temperature

n-factor with value less than 1 depending on air temperature.

vr-reference wind speed=0.03

t_m- body temperature (ºC).

TABLE VII

A GUIDE EFFECTIVE TEMPERATURE OVERNIGHT IN THE CITY OF BAGHDAD FOR THE PERIOD (1981-2010)

Data	Jan	Feb	March	April	May	June	July	August	Sep	Oct	Nov	Dec
Guide	4.7	4.8	5.2	5.9	6.4	7	7	7	6.6	6	5.3	4.7
Analysis	Not happy	Never happy	Never happy	Never happy	Never happy	Never happy	Never happy	Never happy	Never happy	Never happy	Never happy	Not happy

TABLE VIII

THE DEGREE OF PRESUMPTION OF HAPPINESS AND PLEASURE OF DAY FOR THE CITY OF BAGHDAD, FOR THE PERIOD GUIDE (1981-2010)

Data	Jan	Feb	March	April	May	June	July	August	Sep	Oct	Nov	Dec
Guide	4.7	4.8	5.2	5.9	6.4	7	7	7	6.6	6	5.3	4.7
Analysis	Not happy	Never happy	Never happy	Never happy	Never happy	Never happy	Never happy	Never happy	Never happy	Never happy	Never happy	Not happy

TABLE IX

THE DEGREE OF PRESUMPTION OF HAPPINESS AND PLEASURE NIGHT FOR THE CITY OF BAGHDAD, FOR THE PERIOD GUIDE (1981-2010)

Data	Jan	Feb	March	April	May	June	July	August	Sep	Oct	Nov	Dec
Guide	5.2	5.4	5.9	6.5	7.1	7.5	7.8	7.7	7.4	6.8	5.9	5.3
Analysis	Never happy	Never happy	Never happy	Never happy	Never happy	Never happy	Never happy	Never happy	Never happy	Never happy	Never happy	Never happy

The application of the bio-meteorological temperature equalization for the study area is a measure of comfort Rights (sensation). For the use of that equation has been relying on the degree of moist, heat rate, and degree of aerodynamic heat that has been obtained through the air temperature and the body temperature and wind speed. Table X shows that the temperature bio-meteorological for the month of December and January were at a rate of 5.5, and 5.5, respectively. When these results were compared with the temperature bio-meteorological scale, we find that they fall within the uncomfortable climate that trend for cool, because of the low temperatures. While the bio-meteorological temperature for February was 7.1 So this month, is located within the comfortable atmosphere because of the moderation bio-meteorological temperature which rises gradually to separate the theoretical spring months (March, April, and May) with rates of (7.8, 9.8, and 10.8), respectively. When you compare a bio-meteorological heat degree scale, we find that it falls within the temperate climate. Thus, the same for the case of months (June, July, August) have rates of (10.9, 11.6, 12.1), respectively. Within the climate it is uncomfortable and warm due to high temperatures rates would lead to raising the temperature of the body, which directly affects human activity. While the rates of bio-meteorological heat take to decline significantly in the months of (September, October, November) at a rate of (11.1, 0.9, 6.6), respectively. These months fall within the comfortable climate due to mild temperatures. December has the rate of 6.5 bio-meteorological temperature because of the low temperatures.

2. The equation of day bio-meteorological heat:

By adopting the same data were applied the general presumption except replace the average temperature degree maximum temperature as Table XI shows.

A- The month's trend to cool: November, December and January are consisted months trend to cool with a rate of (5.7, 5.9, 5.9), respectively.

B- The temperate months: February, March, April, May, September, and the October are considered as temperate months with rates of (7.3, 8.1, 10.2, 10.9, 11, and 9.3), respectively.

C- The warmer months: represented the month of June, July and August at a rate of (12.1, 12.8, and 12.8), respectively.

2. The equation of night bio-meteorological heat: The adoption of minimum temperatures when applying the formula to extract the presumption of the bio-meteorological night weather, the results of the application were as listed in Table XII, as follows:

A- Cold months: the cold months at night consisted with January and February, the rates of bio-meteorological heat were -2, -1, respectively. It is cold months at night due to the low minimum temperature decreases classified on the bio-meteorological temperature scale.

B- Trend to cold months: November, March, April and May were the trend to cool at a rate of 2.1, 3.4, 3.6, 4.1, respectively, as rates ranged from 1 to 6.

C- Moderate months: June, July, August, September, October and November represented the temperate months at a rate of (6.7, 7.7, 7.6, 7.2, 6.1, 6), respectively.

D. Wind cooling guide

1. Wind cooling rate determined from the equation:

$$\mathrm{K}_o = \left(\sqrt{100v} + 10.45 - v\right)(33 - \mathrm{ta})$$

Where: K_o-air cooling power in kcal/m^2/h

V- wind speed (m/s)

t_a-air temperature (ºC)

100, 10.45-constants evaluated by experiments.

33-avarage skin temperature (ºC).

TABLE X
MONTHLY AVERAGES FOR THE PRESUMPTION TEMPERATURE BIO-METEOROLOGICAL THE CITY OF BAGHDAD FOR THE PERIOD (1981-2010)

Data	Jan	Feb	March	April	May	June	July	August	Sep	Oct	Nov	Dec
Equation result	5.5	7.1	7.8	9.8	10.8	10.9	11.6	12.1	11.1	9	6.5	6.6
Analysis	Tends to cool	mild	mild	mild	mild	mild	mild	mild	mild	mild	mild	mild

TABLE XI
THE MONTHLY AVERAGES FOR THE PRESUMPTION TEMPERATURE BIO-METEOROLOGICAL DAY (M) OF THE CITY OF BAGHDAD, FOR THE PERIOD (1981-2010)

Data	Jan	Feb	March	April	May	June	July	August	Sep	Oct	Nov	Dec
Equation result	5.9	7.3	8.1	10.2	10.9	12.1	12.8	12.8	11	9.3	5.7	5.9
Analysis	Tends to cool	mild	mild	mild	mild	warm	warm	warm	mild	mild	Tends to cool	Tends to cool

TABLE XII
THE MONTHLY AVERAGES FOR THE PRESUMPTION TEMPERATURE BIO-METEOROLOGICAL NIGHT STATION BAGHDAD CLIMATIC PERIOD (1981-2010)

Data	Jan	Feb	March	April	May	June	July	August	Sep	Oct	Nov	Dec
Equation result	-2	-1	3.4	3.6	4.1	7.6	7.7	7.6	7.2	6.1	6	2.1
Analysis	cold	cold	Tends to cool	Tends to cool	Tends to cool	mild	mild	mild	mild	mild	mild	Tends to cool

The wind cooling rate equation was applied as a cooling guide to the study area, to suggest that variations in the guide of cooling wind rates from month to month depending on the temperature difference and monthly rates. The guide of the cooling wind for December, January, and February were at a rate of 512.7, 526.1 and 510.3, respectively (table XIII and XIVa). When comparing these results with the cooling wind guide it shows clearly that it is within a cold climate or trends to be cool on the comfortable scale, because of the low temperatures and represented between 400 to 600. The same thing can be applied to March (411.6) and April (245) and the two months trend to be cooler. As for May cooling wind rate is (105). It thus falls within the comfortable range and pleasant climate and refreshing. June, July and August are located at a rate of wind cooling (46.8, 49.7 and 33), respectively. It is thus within the warm climate which is uncomfortable. Average monthly guide cooling wind for the month of September was 68.9, which it is located within the warm months. October and November monthly average wind cooling rate were 210.3 and 379, respectively.

A- Cold months: October, November, December, January, February, March, and April, all have rates between (245 and 526.6). The rates between (210 and 512.7) are for the months of October and November, which are all trends to be cooler.

B- Nice months: Appears from the tables that May is the only month nice and refreshing at a rate of wind cooling rate of 105. This means that May is the only month convenient to residents of the city of Baghdad.

C- Warm months: Tables XIII and XIV show that September is the only month between the warm months depending on the cooling wind rate of 69.8.

D- Hot months: June, July, and August are hot months and considered uncomfortable and troublesome due to high temperatures rates

2. Wind cooling rate of the day

It has been relying on maximum temperatures rates and the speed of the wind the day to extract the presumption Rest day in the study area (Table XV and XVI). Presumption wind cooling rate of the day during December, January, and February were (347.4, 422.4, 363.8), respectively. So, they are within a comfortable climate that is cold or trend to be cooler. The degree of wind cooling temperatures for March was 245.2, which falls within the climate pattern to be cooler while the night wind cooling temperature for April and May were 93.7 and 79.8, respectively. These two months have a comfortable refreshing and gentle climate because of the mild temperature. The wind day cooling value for June, July and August were 48.4, 48.9, and 47.1, respectively. So, these months fall within the warm climate, because it is at less than the value of 50 on the scale. A wind cooling for September and October were 124.6 to 113.6, respectively. These two months rates lie within the sweet and refreshing climate. While November located within the comfortable environment that tends to be cooler. Table XVII analysis shows the following:

A. Annoying months because of the low temperatures: the analysis revealed that in December, January, February, March, and November are the uncomfortable months, because of the low temperatures. January was the most inclined to be cooler as it was the coldest.

B. Comfortable months (excellent): September and October are the comfortable and refreshing months at a rate of wind cooling of 124.6 and 113.6.

C. Warmer months (can be tolerated): This category characterized May as the month of warm temperature could be tolerated it.

D. Nagging months: June, July, and August represent troublesome months, due to the high temperatures at the rates of (48.4, 48.9, 47.1).

TABLE XIII
MONTHLY RATES TO GUIDE THE COOLING WIND TO THE CITY OF BAGHDAD, FOR THE PERIOD (1981-2010)

Data	Jan	Feb	March	April	May	June	July	August	Sep	Oct	Nov	Dec
Equation result	-2	-1	3.4	3.6	4.1	7.6	7.7	7.6	7.2	6.1	6	2.1
Analysis	More Tendin g to cool	More Tendin g to cool	More Tendin g to cool	Tends to cool	Nice and refreshi ng	Warm	warm	warm	mild	Tends to cool	Tends to cool	Tends to cool
Staging result	C*	C*	C	P*	P	H*	H*	H*	H	P*	P-	C*

TABLE XIV
COMFORTABLE MONTHS DIRECTORY FOR THE WIND COOLING GUIDE OF THE CITY OF BAGHDAD

Data	Months
Nagging months because of the low temperatures (Trends to cool and more tending to cool)	November, December, January, February and March, April, and October
Comfortable months (Nice)	May
Nagging months due to high temperatures	June, July and August
Warm months	September

TABLE XV
MANUAL WIND CHILL DURING THE DAY AND THE CAPACITY OF THE WIND ON THE WIND COOLING DURING THE DAY FOR THE CITY OF BAGHDAD

Data	Jan	Feb	March	April	May	June	July	August	Sep	Oct	Nov	Dec
Equation result	422.4	363.8	245.2	93.8	79.8	-48.4	-58.9	-47.1	124.6	113.6	236.9	374.4
Analysis	More Tendin g to cool	Tends to cool	Tends to cool	warm	warm	hot	hot	hot	Nice and refresh	Nice and refresh	Tends to cool	Tends to cool
Staging result	C	P-	P*	H	H	H-	H-	H-	P	H*	P*	P-

E. Night wind cooling rate

It has been relying on minimum temperatures rates and the speed of the wind at the night to extract the presumption comfortable day in the study area (Table XVIII). Presumption of wind cooling during the winter season (January, February, March) were (647.3, 689.6, 660.6), respectively. So, these months fall within the cold climate because of the low temperature during the night of the study area. However, in the spring, the climate trends to be cool where the presumption of the degree of wind cooling March, April and May (259.9, 220.6 and 208.8), respectively. It is located within the cooler climate scale. The wind cooling rates started to rise gradually in September, October, and November at a rate of (302.9, 407.2, 554.6), respectively. They, therefore, fall within the cold wind climate. Through Table XVI it is clear that every year a comfortable night in the study area being either cool, trends to be cooler, or inclined to cold, and this is important evidence that the study area is a desert climate where rising temperature range and have a cold night.

F. Affecting heat concerning solar radiation and surface wind

The introduction of the effect of wind and solar radiation on effecting temperature guide values (ET) for each of January and July monthly adopted complained one that demonstrates the amount of the increase in the degree of influence of heat due to the effect of surface winds direct solar radiation, which was added to become a directory in the Table of XVII, which shows how much the increase values in the guide values (ΔET), values corrected, illustrated the following:

1- July high temperatures features the amount of radiation as shown in Table XVII Guide values rising to 27.1 which makes feeling comfortable out of the question especially for some groups in society who need their working conditions to exposure to direct solar radiation such as laborers, drivers, and owners of the liberal professions.

2. Low heat affecting guide values vs. the month of January to half of July, because of the low value of the amount of solar radiation in January compared to July, as well as, the wind speed. Table XVI also shows that the value of ET-adjusted 18.8 are few compared to the month of July, as this value indicates that the human sense of comfort.

III. STEPS TO CONVERT RADIATION NECESSARY FOR CORRECTION VALUES

The effective temperature degree (ET) was determined in terms of wet and dry bulb temperature, wind speed, as shown

by Fig. 2 and Table XVb, XVc. ET that the corrected values and the amount of change in decreasing 15.2 and -7 respectively. In July due to high temperatures of wet and dry bulbs, and the wind speed increases. Also, adopt the low degree of bulbs temperature and wind speed for January for the night to 8.1 of the value of ET corrected to 1.9 for the change in the value of ET and is much lower in July and that means turning the weather to cool which leads to the relative comfort in the month of January compared to July.

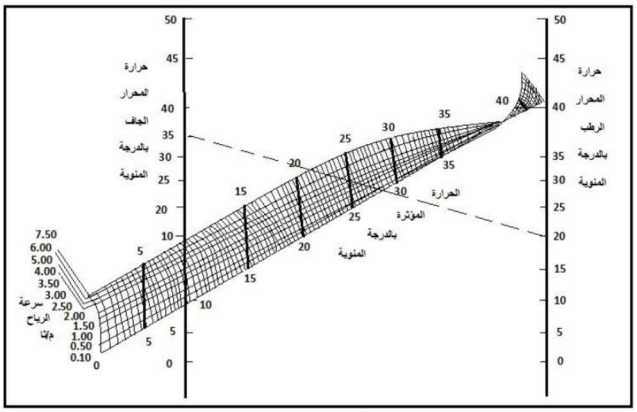

Fig. 2. Calculation ET directory values using temperatures, dry thermometer and wet thermometer and wind speed.

IV. CONCLUSION

1- The concept of comfort a relative concept differs from person to person and from time to time and even for the same individual at different times. Also, the large number of variables that affect the sense of comfort role in the difficulty of finding an accurate and integrated single measure that could be adopted in the measurement. Especially that some of the variables are physiological and psychological.

2- Efficient human heat affects regarding feeling comfortable or not. Where he feels the comfortable transition between comfort and whether or not (with a warm climate) when an effective temperature between 25 and 27 and be the comfortable transition between comfort and whether or not (with a cold weather) when an effective temperature between 15 and 17.

3- Skin temperature affects the human feeling of happiness and pleasure, where the man is triumphal and pleased to be excessive when skin temperature between 1 and 2 and feels uncomfortable when it reaches skin temperature between 4 and 5.

4- The weather will be cold when the bio-meteorological temperature reaches 1°C, while the climate is moderate when it reaches this class between 6 to 12 ºC. But if this level amounted to between 8 and 24 ºC, man feels the hot atmosphere.

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TABLE XVI
REST DAY- TO -MONTH GUIDE WIND CHILL OF BAGHDAD

Data	Months
Nagging months because of the low temperatures (Trends to cool and more tending to cool)	November, December, January, February and October
Nagging months due to high temperatures	June, July and August, April, September, October and May
Nagging months because of the low temperatures (Trends to cool and more tending to cool)	November, December, January, February and October

TABLE XVII
MANUAL WIND CHILL NIGHT WIND AND THE ABILITY OF THE COOLING WIND TO THE CITY OF BAGHDAD

Data	Jan	Feb	March	April	May	June	July	August	Sep	Oct	Nov	Dec
Equation result	689	660.6	589.6	439.2	325.2	259.9	220.6	208.8	302.9	407.2	554.6	647.7
Analysis	Cold	Cold	More tend to be cold	More tend to be cold	More tend to be cold	More tend to be cold	More tend to be cold	More tend to be cold	More tend to be cold	More tend to be cold	More tend to be cold	cold
Staging result	C-	C-	C*	C	P-	P*	P*	P*	P-	C	C*	C-

TABLE XVIII
INFLUENCING THE HEAT GUIDE (ET) CORRECTED IN TERMS OF SURFACE SOLAR RADIATION DURING THE DAY AND HEAT (12.00 AM) FOR THE MONTHS OF JANUARY AND JULY OF BAGHDAD

Monthly average solar radiation mW/cm^2/day 12:00		Average wind speed m/sec 12:00	ET before correction	Increment value (ΔET)	ET After correction	Month
731	24.4	4.1	30.5	6.6	37.1	July
333	11	2.5	12	4.2	15.8	January

TABLE XIX
MONTHLY AVERAGE DEGREE HEAT INFLUENTIAL IN TERMS OF WIND SPEED AT NIGHT (300 GMT) FOR THE MONTHS OF JULY AND JANUARY FOR THE CITY OF BAGHDAD

Dry bulb temperature DB (ºC)		Wet Bulb temperature WB (ºC)	Wind speed m/s	ET Before correction	Corrected ET	ET
33.9	19.1	4.1	22.2	15.2	-7	33.9
8.9	8	2.5	6.2	8.1	1.9	8.9

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